RAILROAD GAZETTE

FRIDAY, MARCH 7.

CONTENTS.

ILLUSTRATIONS: PAGE.
Lake Street Elevated Railway, Chicago, Ill. ... 154
74-ft. Cast Steel Driving Wheel ... 155
Four-way Indicator Cock ... 155
Mitchell & Stevens Compensator ... 156
Standard Dump Car—Boston & Albany Railroad ... 157
Upright Power Drills ... 158
Improved 20-in. Engine Lathe. ... 150

CONTRIBUTIONS:
Shall Distant Signals be Compensated? ... 153
The Warping of Lumber ... 153
Brake Legislation ... 153
Chicago & Alton Clearance Card ... 153
Seals and Loss Claims ... 153

EDITORIALS:
Brake Legislation and the Air Brake ... 160
Party Rates ... 161
Mathematics of the Compound Locomotive from French Studies ... 161

PAGE.
EDITORIAL NOTES ... 160, 162
NEW PUBLICATIONS ... 163
TRADE CATALOGUES ... 163

GENERAL RAILROAD NEWS:
Meetings and Announcements ... 164
Personal ... 165
Elections and Appointments ... 165
Old and New Roads ... 166
Traffic ... 168

MISCELLANEOUS:
Technical ... 163
The Scrap Heap ... 164
Federal Regulation of Safety Appliances ... 153
Compound Petroleum Burning Locomotives ... 155
Electricity on the Northern Railroad of France ... 156
Operating Difficulties in the Far West ... 158
Superior and Duluth ... 158
Shipbuilding in the United States ... 159

Contributions.

Shall Distant Signals be Compensated?

Office of the Union Switch & Signal Co.,
SWISSVALE, Pa., March 3, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Your issue of Feb. 28 contains an interesting article on this question by "Signal Engineer," who takes as his text the remarks made by me at the December meeting of the New England Railroad Club. If the author will reveal his identity (thus also disclosing his motive or purpose) he will possibly stimulate a response, as the terrors of a masked battery will not then exist.

R. H. SOULE.

The Warping of Lumber.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Last January you published a communication from me on the above subject in which I stated a theory to account for the fact that boards will warp in a direction convex to the rings of growth. Recently a very good theory to account for this fact has been suggested—namely, that the outer rings in the tree contain more moisture than the inner rings, so that after sawing they shrink, causing the warp in the other direction. It is doubtful, however, if this will fully account for the warp in boards cut from near the centre of large logs where the rings are far from the sap wood, and the moisture more evenly distributed through them.

C. J. BATES.

Brake Legislation.

NEW YORK, March 3, 1890.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The current number of the *Railroad Gazette* contains some editorial comments upon a bill introduced in the House of Representatives by Mr. R. P. Flower, of New York, regulating railroad appliances. The short extract you give, containing the important features of the bill, sufficiently exhibits its objectionable character, and thanks are due to you for calling attention to it. The bill has the appearance of having been drawn for the purpose of killing off legislation upon the matter, rather than to secure it. The physical impossibility—which you point out—of complying with such a law, which gives barely three years for the completion of the equipments, is strong evidence of this. Additional force is given to this idea by the glaring manner in which the automatic air brake is specified for *all engines and cars in the United States*. Practically there is but one manufacturer of the automatic air brake in the United States. Would Congress consent to use its power for the benefit of one corporation, and at the same time bar the progress of all future invention? The automatic air brake is a good brake when in order, but every railroad officer knows the difficulty there is in keeping it so. If it could be shown that it was a perfect brake and never made a failure, then there might be a show of reason for enacting such a law.

But notwithstanding the immense progress made by the automatic air brake, a glance at the record of accidents in the current number of the *Railroad Gazette* is sufficient to show that our brake system is not what it ought to be. The monthly summary of accidents shows a total of 171, 44 per cent. of which are collisions in which 39 passenger trains are involved. It may safely be presumed that all these latter were equipped with the automatic air brake; and if we compare this with the number of collisions as given in the summary for 17 years, published in the *Railroad Gazette* of Jan. 31, we find that the percentage of collisions has not decreased but increased, being for the 17 years only 39 per cent.; whereas last year, as shown above, they rose to 44 per cent. During these 17 years the automatic air brake was conceived, born, and developed, until there is scarcely a railroad in the United States upon which it is not in use, at least upon passenger cars; yet in the classification of accidents, those under the head of collisions, which ought to be the first to show a decrease by the introduction of a good brake, we find the percentage has gone up from 39 to 44 per cent. This is a strong argument for the necessity of improvement in our brake system, and efforts at improvement may result in something better than we have at present.

The way in which *all engines* are mixed up and included with the cars, as vehicles to be equipped with the automatic air brake, deserves notice. It is well known that to confine an engine brake to "automatic air" depreciates the certainty of braking power upon the engine; at the same time it wrests from the hand of the engineer the alternative in steam, which is not only more certain and more powerful, but which in case of emergency may save both his life and the lives of his passengers when automatic air has failed.

JAS. HOWARD.

[Comment on this letter will be found in the editorial columns.]

Chicago & Alton Clearance Card.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the editorial headed "Some Points of Discipline," in the *Railroad Gazette* of Feb. 14, I beg to call your attention to the practice of the Chicago & Alton. The "Alton" several years ago experienced trouble similar to the Kokomo collision, and the following form of terminal clearance was adopted. Its use for 10 years has shown it to be exactly what is wanted, and during this time there has never been an error made. Enginemen are ordered to be on their engines one-half hour before leaving time. This includes the trip from the roundhouse to the train, at some point distant in the yard, during which time enginemen are busy about their engines, oiling and preparing other details before starting upon their runs. This clearance is handed to the conductor, with a list of telegraph orders affecting his train. The number of each order is entered, and enginemen can check them to know that they have received everything intended for their trains. The clearance itself makes it compulsory for two persons, the operator and the conductor, to check the register, and, if they are not absolutely sure, they must confer with the dispatcher. Experience has shown that it is useless for engineers to check a register, and their time can be more profitably employed about their engine. I remember well how, in former years, when it was the duty of engineers to check registers, they would leave their engines, go over the register mechanically, and, after all, depend entirely on the conductor.

DISPATCHER.

CHICAGO & ALTON R. R.

TERMINAL FACILITIES.

To Conductor and Engineer Train.....
At.....Station.....189

I have no orders for your train
Except Order No.....

TRAINS DUE AT THIS STATION NOT ARRIVED.

Train No.....
.....
Correct: Operator.
.....
Conductor Train.....

OPERATORS will fill out this blank and deliver to the Conductor of each train leaving terminal stations, and on leaving double track for single track.
OPERATORS will be HELD RESPONSIBLE for the Correctness of this Clearance, and must confer with the Train Dispatchers, if not ABSOLUTELY CERTAIN as to what trains are due.
CONDUCTORS receiving this Clearance will sign his name and deliver to the Engineer, when he is fully satisfied by PERSONAL EXAMINATION of the Register Book that this CLEARANCE IS CORRECT.
ENGINEERS must not leave terminal stations, or double track for single track, without this Clearance properly signed by the Conductor and Operator.
This will not relieve Conductors from the RESPONSIBILITY OF KNOWING POSITIVELY before leaving as to the arrival of trains or trains that may be due.
If all trains due have arrived, it will be so noted in the proper line above.

Seals and Loss Claims.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice a communication in your paper of Feb. 21 concerning car seals. I have had some little occasion to think on this matter, with the result of believing that car seals are of very little value except that they may in most cases serve (if proper records are kept) to show where cars are tampered with, and so enable the road where the mischief is done to investigate directly and quickly, which could not be done if the officers had no idea at what point on their line the trouble occurred. It has always seemed to me that settlements of loss and damage to freight should be made on the same basis as it would be if a lock was used on the car without a seal. If a road goes into a through line and accepts its proportion of a through rate, it should pay its pro rata proportion of the losses. In other words, roads forming a line are partners, and should share earnings and losses; if not satisfied to do this, they should check their freight and be responsible.

The initial and terminal points on a through line take upon themselves more expense on through shipments than the intermediate lines, who only take the loaded car and haul it over their road, unless each is allowed terminal charges before the pro rata division is made. Such an arrangement as mentioned above would simplify the settlement of claims, save clerk hire, and prevent many disputes, disagreements and heart-burnings, and in the end it would cost no more to the roads than the present unsettled plan for such settlements. If a car goes through with seals intact it proves (if it proves anything) that goods short at destination were never loaded in the car for which they were billed, and if a seal is evidence it locates the loss on the initial line exclusively, and there is no reason why the terminal line should pay 50 per cent., or any other per cent., of the loss. Looking at the business as partners, each road receiving any part of the earnings should pay a proportional part of the losses.

Practically it amounts in most cases to this, after much sparring and worrying over it. Damage of goods in a sealed car cannot be located (except in case of a train accident), and there would seem to be no other way to settle but to divide the loss for damage in transit pro rata among all roads interested in the line. Seals themselves are not infallible. Many seals are tampered with and show no sign. On through trains the examination must especially be hasty, and every seal which looks right is right. In seal records, as in checking in and checking out, we must depend on men liable to make mistakes, and no one can claim that he is absolutely right and the other fellow absolutely wrong. Saddling the payment of losses on check clerks, conductors or seal record clerks will not make them any more perfect, except that they will absolutely stick to their point, right or wrong. It will prevent getting at facts rather than help to reach right conclusions. "Lead us not into temptation." If all railroad business were done on correct principles instead of the principle of "sufficient unto the day is the evil thereof," and of sliding out of to-day's evil in the easiest possible way, with the view of slipping out of to-morrow's evil on the same principle (even though it involves crossing the trail made in the first case), the result would be more satisfactory and cost-less in the end.

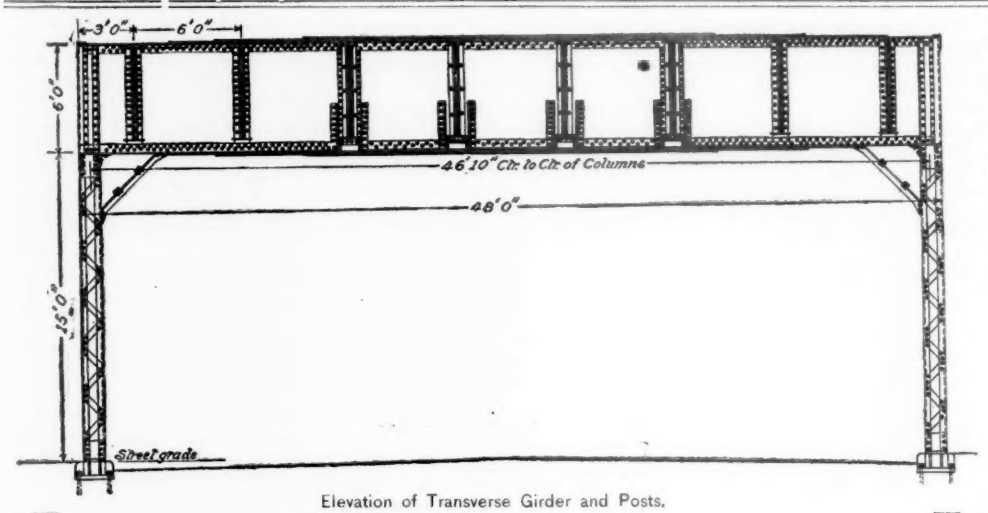
SENEX.

Federal Regulation of Safety Appliances.

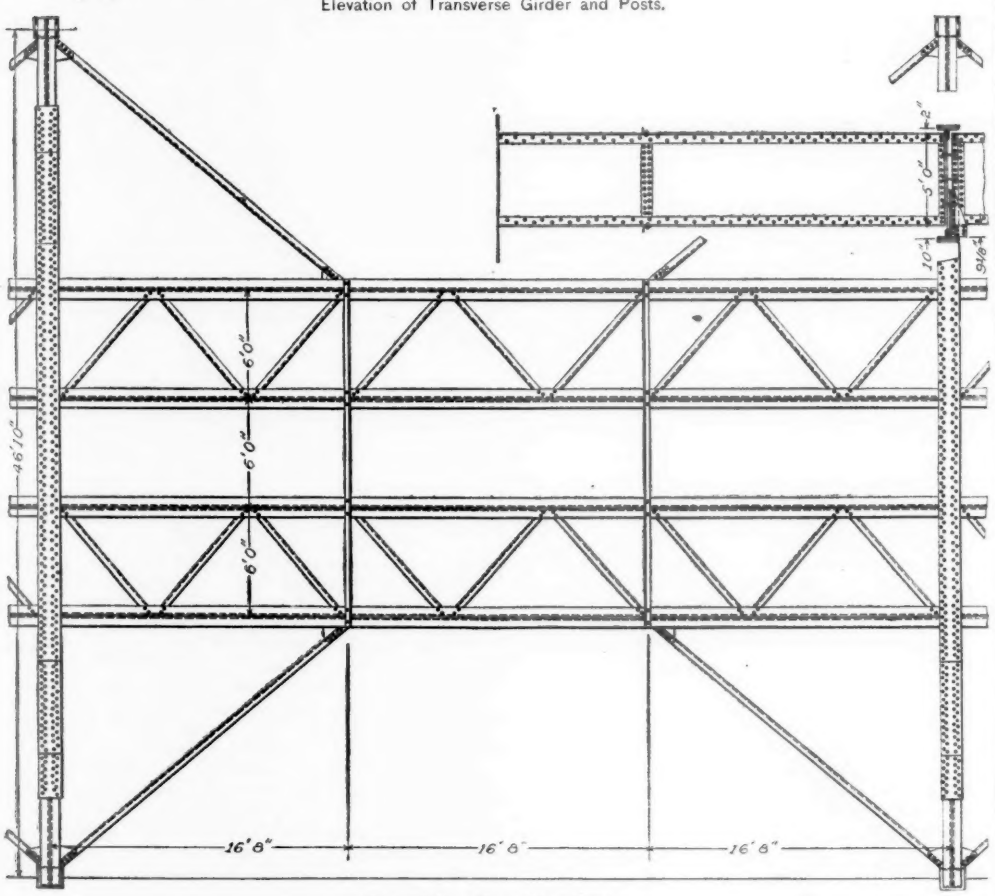
In an appendix to the third Annual Report of the Interstate Commerce Commission is given a mass of correspondence on the subject of federal regulation of safety appliances. A circular letter was sent out by the Commission last May to state railroad commissioners, railroad officers and others, seeking information as to past legislation, as to the present condition of practice in the matter of couplers, brakes, heating and lighting and other safety devices, and asking opinions as to whether or not federal regulation is desirable. In the replies the Connecticut commissioners consider that federal legislation should be adopted enforcing the use of automatic couplers in train brakes, but they do not think that any system of steam heating is yet sufficiently perfect to warrant its forced adoption. The commissioners of Kansas are of the opinion that no federal legislation is desirable; that progress is making as rapidly as is practicable, and that the safety of employés and passengers is a matter of interest to the railroad companies, and will be promoted for business reasons if for none other. The commissioners of Maine do not commit themselves one way or the other, further than to say that, if the wisdom of federal legislation to regulate and control the freight traffic of the country is admitted, far greater reason demands that it be invoked for the protection of passengers and employés. The commissioners of Massachusetts are already on record as favoring federal legislation on the application of couplers and brakes, and have been prominent in urging this upon the Interstate Commission. The commissioner of Michigan doubts whether federal legislation will accomplish much of what is desirable in the way of regulation for the adoption of safety appliances. The commissioners of New York are all of the opinion that the federal authority should be invoked in the matter of automatic brakes and couplers and of uniform couplings for steam heating. The commissioner of Ohio considers that national legislation would aid in securing uniformity. The commissioners of Oregon favor national intervention.

The opinions of individuals which are given in this report are of great weight, coming as they do from men whose lives have been passed in actual railroad work. The first one quoted is that of Mr. Charles Francis Adams, who says that "The whole result of my observation and reflection for more than twenty years has been to satisfy me that all statutory regulation on this subject is unwise," for the reasons that it implies a monopoly on the part of those whose appliances are to be used; that the railroad companies are under the heaviest possible bonds in the shape of damages sure to be rendered against them by juries in case of disaster arising from carelessness, and that if they are to be held to this responsibility they should be allowed perfect liberty of action. It is unfair that legislators should prescribe the appliances to be used and then that juries should inflict penalties in case of accidents arising from the use of them. Finally, Mr. Adams says: "If there is one miracle which has been worked during the last century, it is the miracle of safety with which millions of passengers are annually carried over the railroads of the country with a percentage of loss and injury which is simply miraculous for its smallness."

Mr. John W. Cloud states the difficulty of getting positive data as to the general effect of state legislation in



Elevation of Transverse Girder and Posts.



Plan of One Span, Two Tracks.

LAKE STREET ELEVATED RAILWAY, CHICAGO.

J. Q. BAIRD, CHIEF ENGINEER.

these matters, but considers it probable that the aggregate result has been the reverse of what was intended by the legislators. He says, however, that if no federal legislation is had, and if a board is constituted with authority somewhat like that of the British Board of Trade, it should include engineers of wide experience in the matters it will have to handle, and who are at the same time progressive men; they should be qualified to direct experimental inquiry. Such a board might be of material service to the country.

Mr. T. N. Ely is clearly of the opinion that federal legislation would not be desirable, but thinks that if the Commission would from time to time make suggestions it would have a moral effect that would be good, and it would tend to keep alive the spirit of progress. The results of state legislation have, as a rule, been disastrous, principally from the fact that no board that it would be possible to organize could decide definitely as to the relative merits of the devices presented. In the matter of automatic couplers, he states unhesitatingly that the results already reached would not have been as soon reached through either federal or state action.

Mr. Clemens Herschel says that all legislation of this kind may be classed as proceeding in the lines of the paternal form of government, yet he appears to be of the opinion that in this particular case the benefits of legislation would be greater than the evils coming from it. He considers that the duties of a government board of experts should consist in the main in urging laggards to keep abreast in the struggle constantly going on toward perfection. Herein will always be found an ample field for work. He believes that the work of the Massachusetts commissioners has had this effect in past years and still continues in this direction. Uniformity is at times of extreme value, and this can best be promoted by centralized authority. He does not think that this central authority should have its work closely specified.

Mr. Charles Paine considers federal legislation very desirable to secure uniformity and as a guide to state legislation. For the present it should be confined to the most general enactments, constituting a board and defining its powers and duties. The board should have authority to make rules stating conditions to be fulfilled by devices and to appoint inspectors to investigate and report upon accidents and other matters. These inspectors should have no authority except to require the attendance of witnesses and the production of books and papers. In addition to the subjects of legislation referred to by the Interstate Commerce Commissioners, he considers the matters most in need of help by legislation to be block signals and interlocking. He thinks that the introduction of safety appliances is retarded by the ignorance of railroad directors, who control expenditures upon the roads, and that a government board would be of material aid in this way. Searching investigations by the board into the causes of accidents would give valuable information to directors and to jurors. The board should be an independent body composed preferably of one civil engineer, one mechanical engineer and one patent lawyer.

Mr. G. W. Rhodes considers that continuous brakes are making as much headway as is desirable; the same s true of couplers and train heating. He is extremely doubtful whether either federal or state legislation will produce good results, and considers that the railroads may be safely trusted to do whatever their circumstances will permit in the way of adopting the best methods. He thinks it will be granted that as much progress has been made as could reasonably be expected, and that legislation would probably retard more than it would hasten the application of proper standards.

Mr. E. B. Wall contributes a valuable discussion of the coupler matter, and says that the attempts of state legislation to solve the problem have been in no case successful, and is of the opinion that legislation by Congress would be absolutely fruitless. The railroads of the country are fully alive to the seriousness of the question, and from long study they have reached a conclusion, and they are following out that conclusion with commendable rapidity.

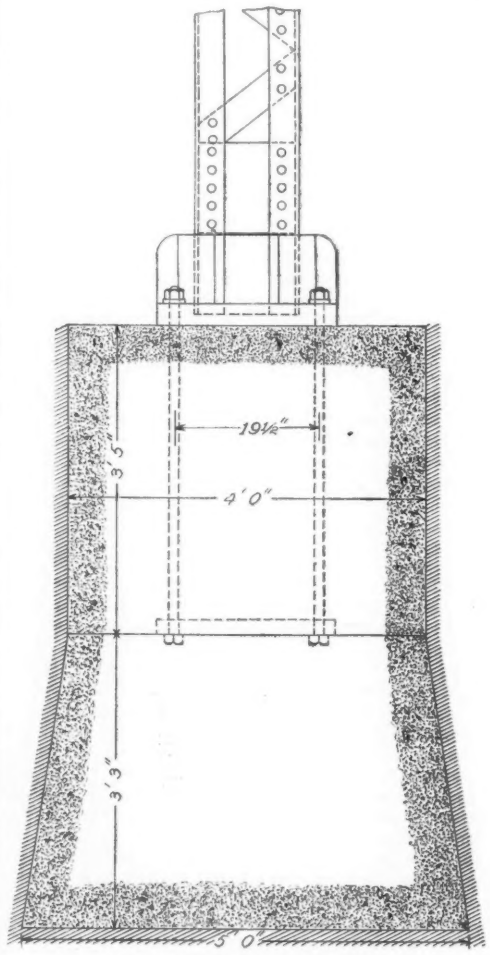
Mr. H. H. Westinghouse contributes statistics as to the number of brakes applied to freight cars, and a short résumé of the history and the development of the freight train brake.

The Lake Street Elevated Railway.

The engravings herewith are from the standard drawings for the structure of the Lake street Elevated Railway, of Chicago, and show a general plan, an elevation of the posts and transverse girders, and the foundation. The line of this road is from the east end of Lake street along that street to the village of Oak Park, about 4½ miles. In order to get a franchise for the line it was necessary to obtain the consent of 51 per cent. of the owners of the property fronting upon it, exclusive of public property. This has been done and the company has contracts with the property owners and receipts for payments for right of way, thus preventing future questions of damages.

The posts, as is seen, are placed on the curb line. The stations are to be built in the middle of the blocks, in buildings bought or erected by the company, leaving the sidewalks entirely free. It is proposed to build the "up" and "down" stations on alternate blocks, and to make them architectural improvements to the street. The entrances and exits will be entirely within the buildings, and many applications have already been received for renting office room in the stations, and the company expects to make them a considerable source of revenue. By the requirements of the ordinance the company is compelled to build 16 stations for 4½ miles of road, but it is contemplated to start with 32.

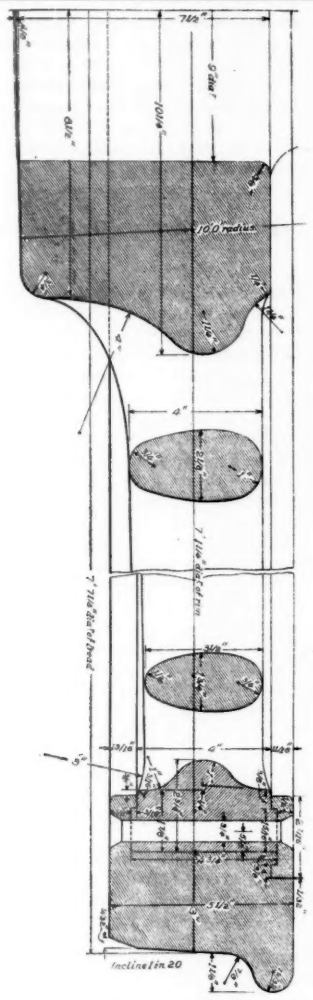
The plans and specifications for the structure have been prepared under the supervision of Mr. Theodore Cooper as Consulting Engineer. A contract for all of the iron work and erection has been made with Messrs.



Foundation and Foot of Post.

Cofrode & Saylor, of Philadelphia, and erection has already been begun. Between twenty and thirty spans are now up. Messrs. Alberger & Fitzgerald are the general contractors for building and equipping the road.

The structure is of wrought-iron posts and girders; the posts having a horizontal section of 14 in. × 15 in. Provision for expansion and contraction of the longitudinal girders to the amount of ¾ in. will be made in each span; one end of the girder being free to move, and the other bolted to the cross girder. The clear spans of the girders will range from 45 ft. to 60 ft. The cross girders will be of wrought iron with upper and lower chords and web members riveted up of plates and angles.



SEVEN AND ONE-HALF FOOT CAST STEEL DRIVING WHEEL.

NORTH EASTERN RAILWAY (ENGLAND.)

No cast iron will be used, except for the washers of the timber bolts. The web plates of the cross girders are 71¾ in. sq., and vary in thickness from $\frac{7}{16}$ in. to $\frac{9}{16}$ in.; the angles 6 × 6 × ⅜ in. Seats for longitudinal girders for two tracks are to be riveted to the cross girders and holes for similar seats for two additional tracks are to be punched and covered with plates. These latter seats are not to be furnished under the present contract. The longitudinal girders are generally similar to the transverse girders. All stringers and cross girders are to be bolted to their connections. The longitudinal flange plates and the angle bars extend continuously, without joints, from end to end of the girders.

The posts are to be made of two wrought-iron channels connected by plates or lattice bars, riveted together. The channels are 15 in., weighing 139 lbs. per yard up to 50-ft. spans and 148 lbs. per yard for 55-ft. spans. The cross girders and posts are to be braced by knee pieces of 6 × 6 × ⅜ in. angles, riveted to the posts and bolted to the girder. No cast iron is used except for the foot plates in the foundation.

The specifications call for iron of an elastic limit of not less than 26,000 lbs. per square inch and provide for careful inspection and tests. No closed sections will be allowed. Riveting must be by machine wherever possible. No hand-driven rivets exceeding ⅞-in-diameter will be allowed, and field riveting is generally to be avoided. The transverse girders, already erected, vary from 40 to 56 ft. in length and in weight from 60,431 lbs. to 79,404 lbs.

The style of foundations is sufficiently indicated in the illustration. They have so far, in all cases, been carried down to the blue clay.

Specifications have been issued for bids for 10 locomotives of the Forney type, and for 50 passenger cars. The general dimensions and extracts from the specifications follow.

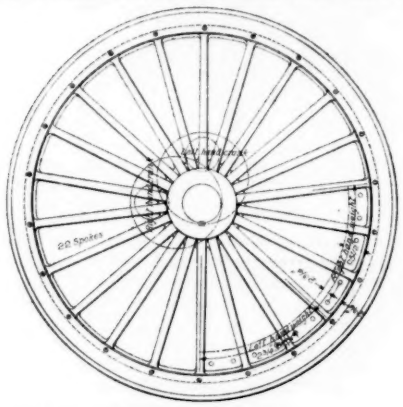
Locomotives to be of the Forney type, having four drivers and four-wheel trucks, 12 × 18 in. cylinders, 47-in. driving wheels, 30-in. truck wheels, 42-in. boiler of the Belpaire type and a fire box 57 in. long and 42 in. wide. The flues, of steel, 154 in number, 1¾ in. in diameter. The fuel to be used is anthracite coal. Total weight of locomotives in working order 50,000 lbs., with 38,000 on the drivers. Otis steel is specified for the shell and fire boxes. All the bearing brasses are to be of phosphor bronze. The standard sizes and tapers of bolts of the Manhattan Elevated Railway of New York City have been adopted. The United States metallic packing will be used on the piston rods and valve stem; the Allan & Richardson balance valve for the steam chest and the driving tires are specified to be of Krupp's steel—whether Siemens, Martin or crucible is not stated. Truck wheels are of the Boise make. Driving boxes are cast solid of phosphor bronze. French springs, Lappin brake shoes, monitor injectors, Mason reducing valves are named in the specifications. The engine and cars will be equipped with Eames vacuum truck and driver brakes.

The dimensions of the cars are as follows: Length of body over end sills, 39 ft. 3 in.; height of body from bottom of sill to top of roof, 9 ft. 5 in.; height from top of rail to top of roof, 12 ft. 7 in.; height from top of rail to centre of drawbar, 2 ft. 6 in. Extreme length of car over all, 46 ft. 3 in.

The framing of the cars will be of yellow pine and white oak, with white ash carlines. The outside ceiling of poplar or white wood. Turn buckles on the truss rods are specified to be of the Cleveland City Forge & Iron Co.'s make. The design of the car roof is like the Boston & Albany, oval top, with 10-in. Globe ventilators. The end doors will be furnished with White's patent friction door sheaves. Seats are to be provided for 46 or more people; they are to be covered with rattan of either Scarett, Hale & Kilbourne's or the Wakefield Rattan Co.'s make. Hicks & Smith's lamps, three in number, are placed near the centre of the car. The Miller Janney combination drawbar will be used. The drawbar to have a free radial swing sufficient to give clearance on curve of 200 ft. radius. The Eames patent vacuum brakes, with No. 4 diaphram, arranged to be operated by hand power from platform if necessary, are to be used. The brake beams are of the Michigan Supply Co.'s standard, with Christy heads and Lappin shoes. The trucks are of the design known as Pullman No. 10, the same as those used on the Brooklyn Bridge cars. Wheels of either the Boise or Washburn type. Bolster springs are the Chase combination triplets, 30 in. long. The journal boxes of the Boston & Albany pattern, known as the Adams' dripless box with Stearns' flexible roller bearings.

Cast Steel Driving Wheel.

The rapidly extending use of cast steel driving wheels in England makes their design and cost a matter of considerable interest, therefore we show a side elevation on a small scale and a section, on a large scale, of those in use on the large Worsdell compounds on the Northeastern Railway, England.



Such wheels as this cost about five cents per pound, delivered, at Newcastle. They are made in Belgium, of a mild cast steel, almost entirely free from blowholes. The counterbalances are bolted in after the wheels are cast. The dimensions of the spokes, hubs and rims, as well as the method of fastening the tires, are given in the cuts. The appearance of the wheel is most satisfactory, and in service the results are such as to warrant an extended use of them on the Northeastern.

Other English roads are using cast steel driving wheels, notably the Northwestern and the Lancashire & Yorkshire. The Northwestern cast their own wheels of steel, and the L. & Y. are meeting with good success in the operation of their steel plant for both truck and driving wheels. The cost, weight and appearance, as well as the strength and reliability of these wheels, make them attractive to railroad men.

Four-Way Indicator Cock.

One of the interesting details of the arrangement of devices for taking indicator cards from the compound locomotive on the Michigan Central is the four-way cock shown herewith. The design was made by Mr. R. M. Gifford, of the Schenectady Locomotive Works. One of these valves is mounted on each side above the steam chest on the cylinders, and to it leads a pipe from each end, and also a pipe from the steam chest which, as will be readily understood, is in direct communcation with the live steam pipe on the high-pressure side and with the receiver on the low-pressure side. There is also an opening to the atmosphere which makes the fourth opening. Fig. 1 shows the various angles to which the handle is moved to make the different openings.

A valve such as this, or its equivalent, is necessary to properly record the various actions of steam in the cylinders of compound locomotives. By it is recorded, on the indicator cards from the high-pressure cylinder, the pressure of steam in the steam chest on that side of the engine. This, compared with the steam gauge pressure in the cab, shows the fall of pressure between the boiler and the steam chest of the high-pressure cylinder, which is a most important measurement to make. When the device herewith is operated on the low-pressure side of the engine the receiver pressure is recorded, and the rise and fall therein noted on the indicator card from that side.

This is not an expensive valve, as can be seen from the vertical section, fig. 2, and the horizontal section and the detail of the spring catch, fig. 3. It is a simple plug cock, with several openings, and can be readily constructed by any good machinist.

Such improvements as this in the operation and construction of the devices for recording the action of locomotives in service are needed to furnish records of the performances of the different types of engines that are sufficiently accurate and complete to permit comparisons of their relative merits to be made on a fair basis which will admit of convincing and indisputable conclusions.

Compound Petroleum Burning Locomotives.

Mr. Thomas Urquhart, Locomotive Superintendent of the Grazi & Tsaritsin Railroad, Southeast Russia, has recently written a paper on the compounding of locomotives burning petroleum refuse. This paper has been published in full in *The Engineer* and *Engineering*. By it is shown that compounding of locomotives results in economy. The statements of Mr. Urquhart are as follows:

"The fuel economy in the passenger engines, the author believes, cannot be less than 20 per cent. in the second or third notch, though there are not yet data enough for confirming this opinion with absolute certainty; it will be greater when the drivers manage the engines better. The mean economy in the twelve goods engines is now found to be 18½ per cent., which is a very good result, though less than what was got in the actual trial of the first one compounded. Including the three passenger engines, therefore, the fuel economy in the compounded engines may now be safely taken at 18½ per cent. in comparison with ordinary locomotives. Last winter, 1888-89, was exceptionally severe, but the compounds ran equally well with the other engines, giving no inconvenience on account of the great cold."

The tests given are with slow-speed engines. The tables accompanying the paper give information regarding the following points: Mean steam pressure and temperature of steam with a high-pressure crank leading; power developed with a high-pressure crank leading; mean steam pressure and temperature of steam, low crank leading; power developed with low-pressure crank leading; comparative power developed by compound and non-compound with equal trains and equal speed at 10 miles per hour.

With reference to the sequence of cranks the following is stated: "In order to test the effect of the reverse sequence of cranks, one engine was altered to have a

Fig. 1.

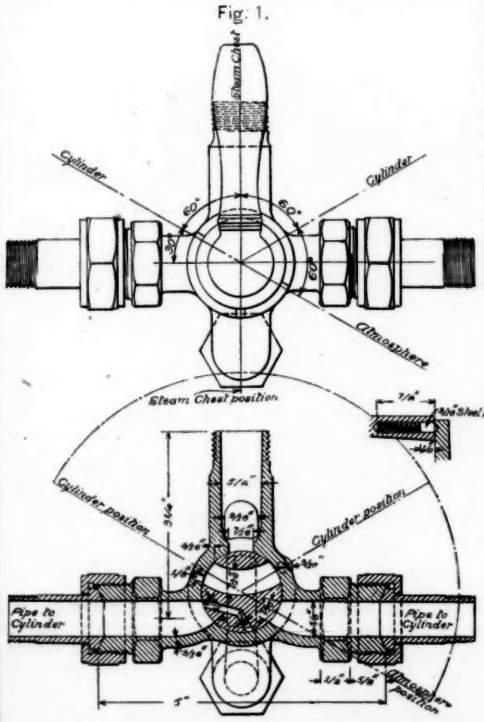


Fig. 2.

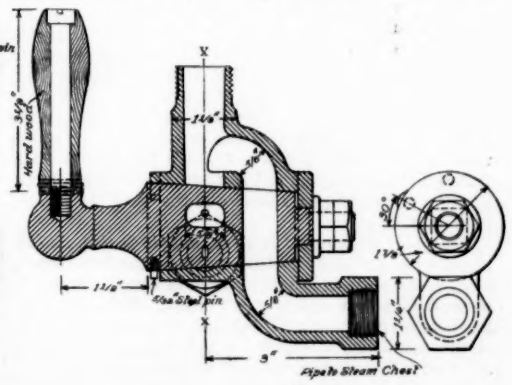


Fig. 3.

FOUR-WAY INDICATOR COCK.

low-pressure crank leading. From the indicator diagram, under these conditions it was noticed that inconvenient and very excessive compression takes place at the first notch on the high-pressure cylinder, so much so, indeed, that this notch is not used; but in all the other notches a good distribution takes place. In the low-pressure cylinder a much better distribution takes place at all notches, compared with engines having the high-pressure crank leading; and this engine, with the low-pressure crank leading, which has only recently been put to work, seems to develop more power and to burn less fuel than the others having the high-pressure crank leading. This is the first time, so far as the author is aware, that the sequence of cranks in compound locomotives has been taken into consideration. The receiver capacity is equal to that of the high-pressure cylinder; and all the dimensions are the same in both the above cases. Four goods engines now have the low-pressure crank leading, while all the passenger engines have the high-pressure leading.

"The idea of making one engine by way of trial with the low-pressure crank leading in forward running originated in its being accidently noticed that one of the other engines, compounded with the high-pressure crank leading in forward running, seemed to work better and to be more powerful, developing its full tractive force with an earlier cut-off and making steam with greater freedom when running backwards with its train, in which case, of course, the low-pressure crank became the leading one. The line on which the tests were made following generally the undulating contour of the plains, its profile has very long gradients of 1 to 125, thus demanding for long stretches at a time the full power of the engine, or say about the third notch out of four. The only objection the author now sees to the low-pressure crank leading is that it gives too much power in the large cylinder and too little in the small, thus putting the engine out of equilibrium; but this irregularity will, in a great measure, be obviated by a receiver about half as large again as those now used."

The observations as to the effect of lap on the steam valves show that a very small difference in lap, outside and inside, means a great deal in fuel consumed. Careful experiments are now being made to determine the law of variation of economy with variations of lap. The comparative consumption of petroleum refuse by compound and non-compound freight locomotives, the mileage, the consumption of petroleum refuse and cost of engine repairs, is stated for compound and non-compound freight and passenger locomotives for five months in 1889. These tables show that the compound locomotives used 5.31 pounds of fuel less per mile than the non-compound on the average. This means a saving of 18.96 per cent., according to the tables. It is also stated that there was a saving in repairs of 28.8. Accompanying the tables are a number of indicator cards showing distribution of steam. One of the notable features of these cards is a large amount of compression at short cut-offs in the high pressure cylinder.

A New Compensator for Signal Wires.

We illustrate in this issue the Mitchell & Stevens two-wire mechanical compensator as used on the New York, Lake Erie & Western.

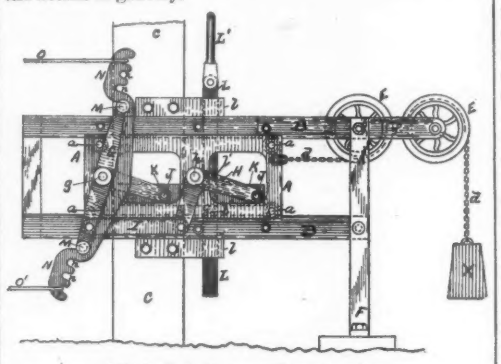
This compensator was designed in October, 1888, by Mr. A. E. Mitchell, the engineer of signals of the Erie system at that time, and Mr. W. N. Stevens, his assistant, and was immediately placed in service on the most troublesome distant signal on the eastern division of the road.

The compensator is composed of a casting or frame *A*, mounted on flanged rollers *a*, and moves freely backward and forward between two guides or tracks *B* securely bolted to the signal post *C*. On this casting is journaled a T crank *G* and a bell crank *H* connected together by the strap *I*, which insures that both cranks shall always move with the same angular velocity. On the corresponding arms of these cranks respectively are securely fastened pins *J* which extend to the rear of the casting *A*, and there carry a bar *K*, of length greater than the total expansion or contraction of the line of wire. This bar is usually made 20 in. long. To the signal pole are also lag-screwed two guide castings *l* for supporting the bar *L*, to which the lower end of the rod *L'*, which is connected at the top end to the signal blade casting, is pinned. To this bar *L* are pinned two small flanged rollers *l'* placed on either side of bar *K* and engaging with it with what is known as a rolling connection.

It is therefore self-evident that whatever angular motion is given to the cranks *G* and *H*, the bar *K* must either rise or fall, will always remain parallel to the guides or tracks *B*, and at the same time will either raise or lower the bar *L* and move the signal blade through the connecting rod *L'*, regardless of the relative position of the flanged rollers *l'* to the bar *K*, as regards its length.

The safety attachment is a very simple device, consisting of a piece of thin sheet iron made in the form shown at *N*, which rests in grooves turned in the pins *M*, firmly secured in either end of the T crank. This safety bar has notches at either end to permit of a variable stroke of the operating lever, and is held in position only by the wires *O'O* resisting the pull of the weight *X*.

The compensator is connected up with two wires, as shown, one wire on either end of the safety attachment, respectively, and the weight *X* is attached by means of a chain to plate *A*, thus maintaining a given tension on the wires at all times. Should the wires contract, each wire will shorten a like amount on account of being the same length, the plate or frame *A* will move toward the operating lever and the weight will be raised. Should the wires expand the frame *A* will move in the opposite direction and the weight *X* will fall, but neither expansion nor contraction of the wire has any effect on the position of the signal blade. Now, should the operating lever be reversed the T and bell cranks *G* and *H* would rotate on their centres *g* and *h* without affecting the weight *X;* the bar *K* and rods *L* and *L'* would be raised and the signal blade thereby moved to safety. Should one of the two wires break, the safety bar *N* would rotate around the pin *M* nearest to the unbroken wire, being assisted by the weight *X* falling and pulling the frame *A* away, until it would finally turn the safety bar to a horizontal position and be entirely disengaged. The signal would then go to danger automatically by the action of gravity.



Mitchell & Stevens Compensator.

When using this device on a signal pole the usual counterweight lever, casting and weight, placed a few feet below the signal blade, are dispensed with.

In erecting this compensator care has to be exercised only to get the proper amount of stroke of the wires at either end of the safety attachment and to leave the frame *A*, carrying its moving parts, to work perfectly free. One hundred and twenty-five pounds of counterweight on a line of two wires, 1,500 ft. in length, is ample to make it work perfectly if the line is properly erected. This is just sufficient to keep the wires taut and gives a tension on each line of 62½ lbs.

When moving the signal through the operating lever the work to be done is only to overcome the friction of the journals and raise the bar *K* and rods *L*, and this work is done through long leverages and is accomplished with ease.

Many of these compensators are in use on the Erie system, and the National Switch & Signal Co. has placed a number on other roads. We give below a letter dated Dec. 10, 1889, from the Signal Inspector of the Eastern Division of the Erie road to Mr. Stevens, one of the inventors, which is self-explanatory:

"Referring to the two wire mechanical compensator, the trial one of which was placed on the westbound distant block signal pole at Ramapo, Oct. 12, 1888, I would state, that, although made out of odds and ends picked up in the machine shops, this compensator has worked perfectly from the day it was placed in service. As you will remember, Mr. Mitchell locked the door of the housing to this compensator immediately it was completed, and from that time until last May neither I nor any one else had access to the machine, nor did we need it, as it never got out of repair. After the patent was issued, Mr. Mitchell removed the lock and notified me to look after it the same as all other signals under my charge. From that time to the present nothing has been done in any way to the compensator, except once, some time in August last, when one of the split links in the chain connection broke and dropped the weight, causing the signal to go to danger. Since this trial compensator was placed at Ramapo, I have placed nine others on different signal poles on the Eastern Division, and in no instance up to this writing has one of them failed to keep the wires taut and yet allow the signal to be worked with perfect ease, and yet five days ago the thermometer showed the temperature 2 degrees above zero, and to-day it stands at 65 degrees at noon. We had one distant signal that was 1,940 feet from the lever in the station, and we were obliged to abandon it for two months until we could get one of these new compensators. Since putting this on we have had no further trouble. Another distant signal we erected 2,710 feet from the lever in the signal tower, and we were also obliged to let this signal stand idle for some four months until we could get a compensator on; whatever we did before would not accommodate the expansion and contraction of this length of wire. This last-mentioned signal was on a curve nearly the entire 2,700 feet.

Day after to-morrow, Dec. 12, will be 14 months since we erected the first compensator of this style; the tenth was placed in service the 6th of this month, and as yet I have no record of the failure of a single one.

Standard Dump Car—Boston & Albany Railroad.

We print herewith carefully prepared drawings of a standard gravel car recently constructed from new designs at the shops of the Boston & Albany, at Allston, Mass. The details are so clearly shown that particular description is unnecessary. The wheels are 30 in. and weigh 550 lbs. each. The axle is the same length as the M. C. B. standard, and the journals are collarless, 4½ × 7⅜ in. F. D. Adams' dust proof journal box is used. This road hauls (as it has for many years) large quantities of gravel from points within 20 miles of Boston to the low grounds bordering on the Charles River within that city, and this car has been designed with a view to facilitating this work. The capacity of the car is nine cubic yards, more than double that of the common dump car, and a load of that size weighs about 15 tons. The weight of the car when empty is 16,500 pounds. One man can tip the car, dump the load, and replace the body in position for travel in two minutes.

Electricity on the Northern Railroad of France.

II.

The following condensed description of the electrical apparatus exhibited at the Paris Exposition is continued from the *Railroad Gazette* of Feb. 21:

X. All passenger trains are furnished with the Prudhomme system of electric bells for the purpose of calling the guards. In each compartment is seen a ring attached to a chain; pulling this chain causes a bell to ring at each end of the train, and an indicator appears at the side of the compartment from which the signal is given which shows to the guard where his presence is desired. If the train breaks apart a bell rings at each end as if a continuous call were made.

XI. To facilitate obtaining prompt relief in case of a break down to a train upon the road, there are frequently placed between the stations telegraphic instruments in a locked box with the key hanging on the wall over the box. Inside is a dial telegraph with switches for making the proper connections with the wires leading to the stations at either side of the point where the instrument is located. At these stations is a special bell which is not affected by the ordinary currents passing over the line, but when the dial telegraph is operated it sends over the line a current in the reverse direction from that for the ordinary business, which causes the special bell to sound, and calls attention to the signal of distress, to which immediate response is to be made.

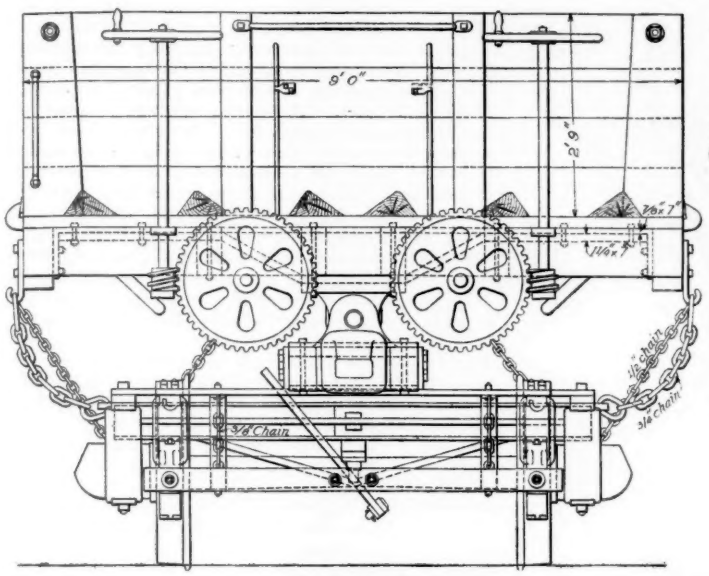
XII. The regular telegraph station contains both the dial telegraph and the Morse telegraph besides the special call bell just referred to, and, of course, lightning arresters, galvanometers and the other usual appurtenances of a telegraph office.

XIII. A liberal use is made of telephones for communication between stations and yards, stations and roundhouses, and for other purposes, also to furnish a means of communication between the signalmen and switchmen in important yards, etc. The commutators for this purpose are so arranged that they can be used for signaling between the men independently of the telephone, should that be disabled or for any reason not working satisfactorily.

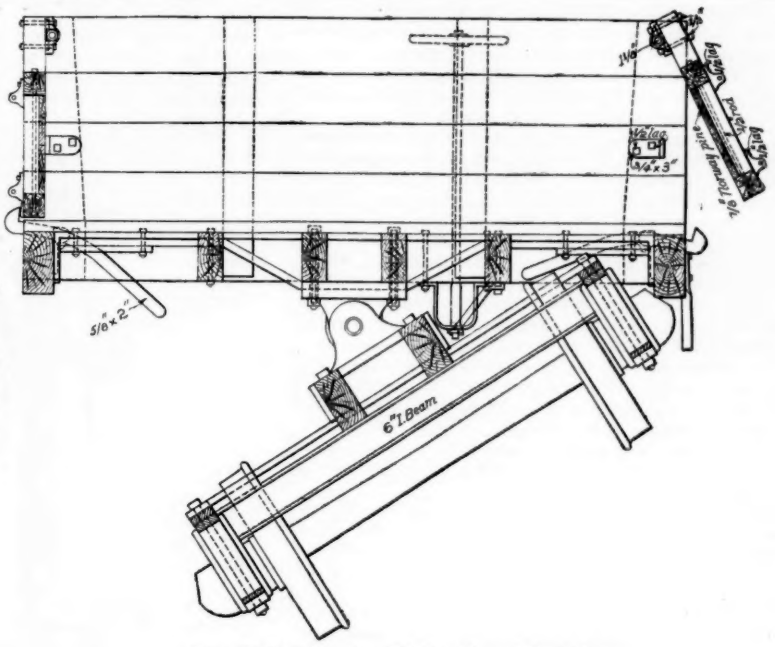
XIV. To economize space in store houses and on wharves, etc., sacks of sugar and grain and other commodities are placed in piles. For handling this kind of merchandise the company has put in at the station of La Chapelle an electric crane. Mounted on a platform are two electric motors; the first serves to move the crane itself along the track which runs through the shed or store house, and the second is for raising and depositing the sacks. The electric crane is driven from a dynamo machine or from a battery of accumulators. With this apparatus, four men, including a stoker and the man who operates the electric machine, can pile 100 sacks in less than 40 minutes. To lift from the wagon a weight of 140 kilogrammes, carry it 23 metres, and deposit it on the pile and return to the point of departure requires but 35 seconds. It is believed that a considerable saving will result from the use of the crane in place of the men formerly employed for this work.

XV. This company has made some attempts to use electricity for the purpose of moving switches as well as locking them in position. This is accomplished in two ways: (1) by means of a solenoid, in connection with the locking bolt, which has been tried in the station at Paris, and (2) by a more promising method, which consists of a small electric motor placed between the points of the switch, which gives a rotary motion to two helicoidal screws. The switch is moved in either direction by sending a current through the motor in one or the other direction, as the case may be. When the current passes through the motor in one direction, the screws are rotated and the switch is moved, say, to the right; when the current passes in the opposite direction it is moved to the left. By means of stops at the end of the throw of the switch, the points are brought very exactly against the main line rail. A particularly important feature of this apparatus is that the unlocking of the other levers of the combination is performed by the electric current and is made to depend on the points of the switch being brought to the proper position and bolted there, and until this is done no other levers can be moved. The throw of the switch is 4.4 in., and the effort required to move it varies from 110 lbs. to 154 lbs. Allowing for the friction of the helicoidal screws, there must be exerted a power of 176 lbs. Calculation shows that a force of about 1.6 horse power will do this work in one-half second.

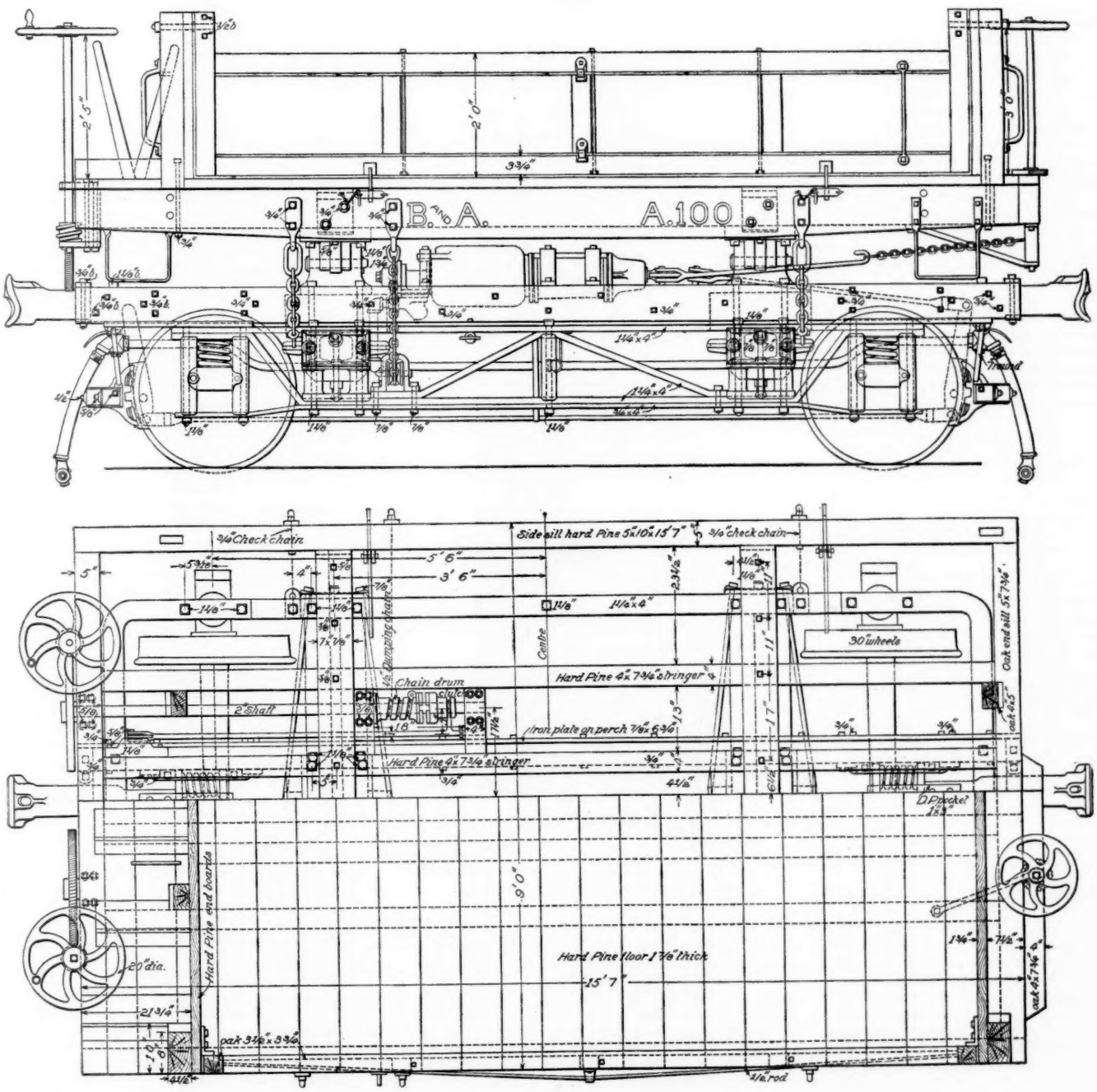
XVI. The company installed in 1880 a system of hydraulic capstans to take the place of horses for the movement of cars on transfer and turn tables at the La Chapelle station. These were replaced in 1887 by new apparatus comprising a pump of 44 horse power, two hydraulic accumulators of 37 tons each, giving a pressure of about 700 lbs. per sq. in. There were 11 capstans,



End Elevation.



Cross Section Showing Side-boards and Fastenings.



STANDARD DUMP CAR—BOSTON & ALBANY RAILROAD.

giving an operative force of 880 lbs., and having a velocity of 23.6 in. per second, and there were 2,100 ft. of pipes. To draw a car on the turn table occupied 36 sec. The capstans being in use only about one-sixth of the time, it is proposed to substitute for the hydraulic accumulators electric motors, the current for which is furnished by electric accumulators charged from a dynamo.

A comparative trial of several different forms of apparatus has been made, of which one only, however, is exhibited. These were required to develop a force of 880 lbs. at the periphery of a capstan 15.6 in. in diameter with a velocity of 70 turns per minute. To get this force required the expenditure of over seven horse power at the moment of starting, to four horse power when running regularly. The velocity can be reduced from 70 turns down to 12 turns per minute, if the voltage of the current be changed from 200 to 100 volts. The electric motor is geared by means of toothed wheels directly to the drum of the capstan, so that there is no slipping of belts or lost motion, such as would be the case with transmission by chains. This apparatus is inclosed in a

locked vat or tub perfectly water tight, so that a thorough inspection of every part is easy. The maximum force to move the capstan is taken as 1,100 lbs., allowing 10 per cent. for loss; a current of 210 volts and 25 ampères will give this maximum effort. To supply this there are 105 accumulators, weighing 55 lbs. each.

XVII. An exhibit was made of the apparatus used by the company for electric lighting. The accumulators used by this company are composed of four positive and three negative plates, the whole weighing about 55 lbs., with a total capacity of 250 ampère hours, about 4.5 ampère hours per pound of weight. The storage batteries used in America (of which the Julian cell, "type B," may be taken as an example) always have a larger number of negative than of positive plates (the cell spoken of having 10 negative and only nine positive plates)—just the reverse of the French arrangement. This weighs about 27 lbs., and has a capacity of nearly, or quite, 150 ampère hours, or about 5.5 ampère hours per pound, which is more than 20 per cent. better than those used by the Northern Railroad of France. These accumulators, the company says, are a very desirable apparatus, with long life, very little expense of maintenance and very little manipulation. There were in operation last spring eight workshops lighted by electricity, requiring 300 horse power and a total current of 2,000 ampères; by the end of 1889 there were to be in operation 10 new installations, using more than 600 horse power.

XVIII. The company has made several trials of an electric apparatus for synchronizing clocks. The principle adopted is that it requires the reversal of the current at each impulse to perform the work, so that neither an exceptional double contact nor atmospheric electricity will affect the clocks. Two batteries are used, to each of which is connected a light spring in a standard time piece. The controlling clock or regulator has a wheel with a projection which comes in contact with each spring once in a minute, sending to the line a current in opposite directions alternately. The dials which are run by this regulator are so arranged that two currents following each other in opposite directions are necessary to move the hands, which are then locked in position until the next impulse. For several months all the clocks in the station at Paris have been run from one regulator (by a system somewhat different from that just described) with entirely satisfactory results.

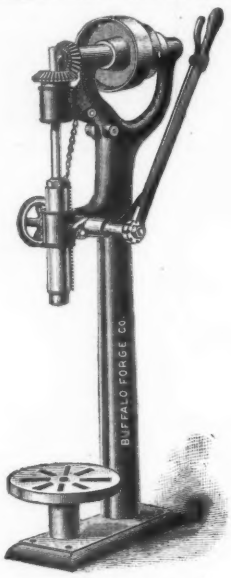
The above completes a very much condensed description of the electric apparatus shown by the company, and it will be seen to what a high degree of development its application has been brought. In no other country, as we think, have such a variety of uses been made of this force, and with such satisfactory results. It is highly probable that in our own country, where the price of labor is relatively much higher than in France, there are many kinds of railroad work in which electricity might be used with great convenience and economy.

Upright Power Drills.

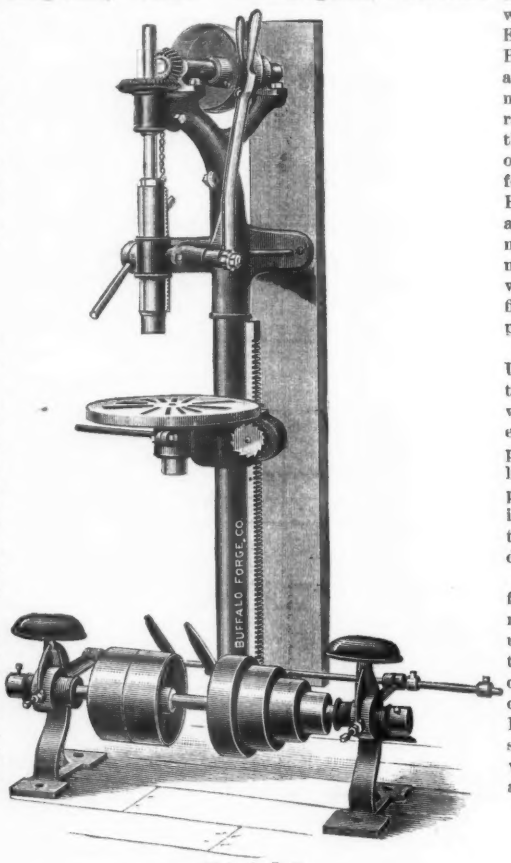
The drills herewith are made to meet the demand for a durable and serviceable power drill for general work. Both designs have noiseless machine cut gears; the spindles are bored for a ¾-in. Morse taper shank, and will drive drills up to 1¼ in. diameter. A special attachment for carrying wheels while drilling the tires is supplied for the large drill; it is especially adapted for the work of carriage makers and greatly facilitates that class of work. The large machine is arranged for four changes of speed, will drill to the centre of a 20-in. circle, is provided with an adjustable bed for raising and lowering, weighs 320 lbs. and is 67 in. in height. The smaller will drill to a centre of a 11-in. circle, has three changes of speed, is 50 in. high and weighs 150 lbs.

The new design of countershaft, also shown, is adapted for tight or loose pulleys and is made in suitable sizes for the small power drills. The bearings, which are of a length of five diameters, are solid, not babbitted, and are bored out and reamed to gauges. The hanger and shipper arm are all of one piece, which is a great convenience in putting up the hanger. The length of countershaft is 32 in., diameter of pulley 8 in. and should be run at 250 revolutions per minute.

These drills are made by the Buffalo Forge Co.



11-inch Drill.



20-inch Drill.

Operating Difficulties in the Far West.

A correspondent in Utah sends us the following account of some of the perplexities encountered in running trains in the Rocky and Sierra Nevada Mountains and on the "Great American Desert:"

It is generally thought throughout the Eastern states that good men can be obtained anywhere in the United States to perform ordinary labor, such as is required in running freight trains or in maintenance of track work, provided that the compensation is in fair proportion to the service given. Unfortunately this is not true, at least of several sections of the West some 2,000 miles west of Chicago, through which pass the great trans-continental lines and their branches.

Take the region, say, commencing 400 miles west of Denver and extending to the California line. One finds a "bum," tramp element of would-be trainmen, constantly on the go, looking for a job, which if they get, they will only hold long enough to make a few dollars, sometimes two days, seldom over a month. They are worthless tramps, who are drunk half the time. There are a great many thieves among them, and loss of such freight as boots, hats and clothing can be traced directly to them; but possibly, by the time the short report or claim has reached you the men have resigned or have been discharged. These fellows seem to enjoy smashing a switch lock with a coupling pin rather than go to the trouble to use a switch key. A few weeks ago six switch locks were broken in as many days in the east end of one of the yards here. The culprit was caught, but his earnings hardly paid his board. About six weeks ago, while one of the roads was doing some heavy reconstruction work in the mountains, a freight train had a very bad wreck at night, some 16 cars being totally wrecked. On investigation, it was found that the train was running 35 or 40 miles per hour regardless of an order limiting the speed of all trains to 15 miles per hour over a considerable distance. The entire crew was drunk.

There is no use in talking about discipline with such fellows. Men who don't care for their own lives can't be made to care for the property of others. Lay a man off, even for a few days, or fine him for loss of a switch key, and he immediately wants his time, telling you how many positions are waiting for him over on the C. P. or N. P. or D. & R. G.

Don't hire this class of men, you say. Well, how can it be helped? It is necessary to have men to run the trains. There are so many things in the far West which offer large profits from small investments, and Nature has left her wealth in gold, silver and lead so thickly strewn over our mountains, that the good men, as a rule, give preference to the trades or mining.

There is another point about running trains in this country. On some roads there are long stretches of barren desert, 100 to 200 miles across, with but little life of any kind. Possibly one of the regular runs will be back and forth over this desert with none too good quarters at either end. Say the main division is 500 miles in length, and there are a good number of your old employés married, whom you cannot very well ask to take these unpleasant runs, which takes them away from home most all of the time. This throws "the desert" on new men, the unmarried men, or men you can change back and forth. No matter how you arrange the runs, the men always think you are trying to impose on them, and that it is your intention to keep them on the desert or on the water train all the time. The "water train," by the way, is something one does not see on an Eastern timetable or despatcher's sheet. It is simply a train to carry fresh water to desert points.

In the construction and maintenance departments the same difficulties are encountered. On the deserts many of the roads employ Chinese laborers under the direction of white foremen. This does not seem to be good railroading. Section men are called upon to do all classes of duty, and it hardly seems a straight American idea to intrust the flagging of a fast passenger train, or the inspection of tracks and bridges, to a Chinese, whose only ambition is to have enough rice to eat and opium to smoke.

The adage, "Young man, go West and grow up with the country," seems to have been followed by every young man who could not succeed at anything at home; young men, and old ones, also, whom no one wanted to employ, and who were celebrated for general good-for-nothingness, have come out here. There are, of course, a large nnmber of old and faithful employés, who are trusted and respected by their employers. The Union and Central Pacific companies naturally have the largest number of old employés in the train service, and it would be a good thing if the officers of these companies were to enlighten their less fortunate neighbors on the art of keeping good men.

It must be remembered that in this section of the West almost all the freight equipment has air brakes, and that the greater part of the business is through freight, making but little work for the trainmen. The wages paid in the West are better than those in the East. This rule holds good in nearly all businesses. But living is higher; so one comes out, financially, about the same as in the East. The West offers not so much the money but the opportunity for rapid advancement. The territory of Utah, with the city of Salt Lake (to-day the most promising city of the entire West) as its capital, offers many chances for railroad men; so also do Nevada and Idaho. Why? Building of new lines, doing much work on old lines, and increased traffic necessitate more trains, which means more men. There are plenty of chances for good men—men who bring with them proper credentials, and who are willing to put up with a little of the rough at first, the same as those who now hold the pleasanter positions have done.

What is wanted, not only in the West, but all over the United States, is an improvement in the standard of train men. There is a demand for clear-headed men, who on the passenger trains can take care of the modern appliances now employed for the comfort of the passengers; who can protect *both* ends of the train, and look after the hundred details connected with running a passenger train. These points must be understood, not in a half-way style, but perfectly, so that when the time comes to act the proper thing shall be done immediately.

With automatic couplers, air brakes, and fast time, freight train work is not what it used to be. There is not so much hard labor or risk, but here, too, men must understand all the signals, the various rights of the trains, the way to repair any slight damages to couplers, air brakes or journal boxes, also how to make out the necessary reports, a matter of great importance. Learn to write an ordinary hand, even if you are a switchman. A report from a conductor or brakeman which is both correct and neat is a silent testimonial always on file to his credit. DE.

ZION, Feb. 8, 1890.

Superior and Duluth.

Nearly 40 years ago a party of capitalists (they would now be called a syndicate), possessing considerable financial resources and great political influence, took up a large body of land at the head of Lake Superior and laid out a city which they called Superior City. As the St. Louis river is for some distance above its mouth a series of cascades, it was not available for even canoe transportation, and the resources of the syndicate were not equal to improving the "natural entry," hence Superior City had nothing more valuable than expectations of a trans-continental railroad, which many of its owners opposed on political grounds. But they were not opposed to getting a large price for their favorably-situated lands when the Northern Pacific was started, a larger price than the managers of that road were willing to pay; so a steep and rocky hillside was bought, a canal cut through Minnesota Point, and Duluth was launched on the world as "the Zenith City of the unsalted seas." As the Northern Pacific Railroad failed in 1873, this proceeding did not immediately help Duluth. It injured

those that bought lots there; it, however, apparently killed Superior City.

But during the past 20 years the centre of gravity of our railroad system has moved west of the boundary line between Ohio and Indiana to near the centre of Illinois. The Sault Ste. Marie Canal has been deepened and enlarged so as to carry the largest "lakers," and Duluth, which in 1870 had but one line of railroad, now counts nearly 13,000 miles as tributary to the growing commerce at the head of Lake Superior. The mileage, combined with its position at the extreme western end of deep water navigation on this continent, has forced the railroads to it give increasingly favorable rates. The effect of these rates in connection with the other advantages mentioned have put the two towns on the Bay of Superior ahead of Chicago as handlers of wheat and flour, and nearly abreast of it as handlers of lake borne coal, as the following tables of shipments and receipts in 1889 show.

	Wheat. bushels.	Flour. barrels	Total wheat bushels.
Chicago	10,330,675	1,804,260	18,449,845
Bay of Superior	13,311,856	2,020,953	22,406,145

Receipts of lake borne coal:

	Tons.
Chicago	1,283,811
Bay of Superior	1,205,000

In addition to wheat and flour, a little over two million bushels of corn were received during the last year. Very little of the wheat, however, has so far been ground on the Bay of Superior, though a very large mill is now built, which went into partial operation last year. The elevator capacity is 20,800,000 bushels, and 520,000 bushels of grain were loaded into vessels in the course of one day last November.

In addition to the grain trade, there is a considerable business done in lumber, which will shortly be increased by building a railroad that will transport logs from the St. Louis River, above the Dalles, to the Duluth sawmills. This road will probably be extended through the Messabi iron range to a connection with the Vermillion mines, making Duluth an ore shipping port. If the discoveries in Itaska County prove, on testing, to be Bessemer ores, the output of those mines will be shipped at Superior City and Duluth. The value of the iron ore trade to the commerce passing through the "Soo" Canal is shown by the following table:

	1888.	1889.	In. or dec., per ct.
Registered tonnage	5,130,659	7,221,935	+41
Freight carried, tons	6,411,423	7,516,022	+17
Flour, bbls	2,190,725	2,228,767	+2
Wheat, bushels	18,596,351	16,231,854	−13
Other grain	2,022,308	2,133,245	+5
Pig iron, tons	63,703	57,561	−10
Iron ore, tons	2,570,517	4,095,855	+59
Lumber, M. ft	240,372	315,554	+31
Coal, tons	2,105,041	1,629,197	−23
Copper, tons	28,960	33,456	+16
Salt, bbls	210,433	168,250	−20

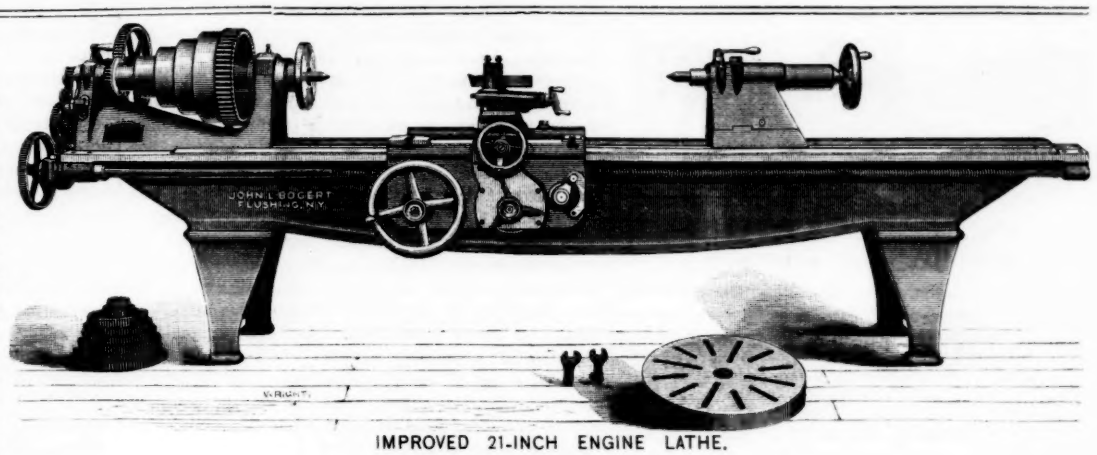
From which it will be noticed that nearly 55 per cent. of the total freight, up and down, passing through the canal, was iron ore, and of the 7,292,754 tons of Lake Superior ore shipped last year by all routes, over 56 per cent. came through the "Soo" canal.

The larger proportion of this traffic is in goods of low price, the estimated value of the goods passing through the canal in 1888 having been only $82,156,019, or about $12.80 per ton. General O. M. Poe, U. S. Engineer in charge of the canal, found that in 1887 the average freight charge per ton on goods passing through the canal was 0.23 cents per ton mile, and the average distance transported was 811.4 miles. If we assume that the freight charge by railroad would have been 1 cent per ton mile, the charges would have been by lake $1.86, as against $8.11 by railroad, and the difference amounts to over 48 per cent. of the average values of the goods transported.

This cheap transportation has greatly accelerated the development of the country to the westward of Lake Superior, and the cities at the head of the lake, boasting a population of 60,000, have so far expanded that their interests are all common, except the town lot interest. But the inconvenience and expense entailed through the difference of opinion as to the value of property in Superior City some 20 years ago will never be fully adjusted, though by building inclined planes to a plateau some 600 ft. above the lake shore it is hoped that a practicable area for residences can be utilized.

Improved 21-inch Engine Lathe.

The increasing demand for heavy shop tools has brought out the engine lathe shown herewith. In its design particular attention has been paid to the production of a stiff and rigid bed and a distribution of metal that gives as nearly as possible a maximum rigidity for a minimum weight. The head-stock has carefully fitted adjustable boxes, lined with phosphor babbitt. The valve spindle is hollow, having a hole 1¼ in. in diameter, and carries a five-step cone for 3 in. belt. A neat rocker device enables the direction of feed to be instantly reversed without disturbing the change gears. The lead screw is 1 9-16 in. in diameter, cut three to the inch as near to an exact pitch as is practically possible. The thread of lead screw is used only for screw-cutting, the longitudinal and cross feeds being driven from a splined shaft. The half-nuts on the screw are opened and closed by short movement of a lever, and cannot fly open under any circumstances. Both power feeds are frictional. The cross slide is 20¾ in. long, and is fitted to support either Bogert's improved elevating tool posts, or improved compound rest. A simple device is furnished whereby the compound rest or elevating tool post may be mounted on the front of the carriage when short work larger than 15¾ in. in diameter is to be operated upon. The cross feed screw is protected from chips. The tail stock spindle is 2⅝ in. diam. eter and 16½ in. long. The centre rest will admit work up to 9 in. Bogert's improved friction clutches and improved method of oiling loose pulleys are applied to the countershaft. A new and improved taper-turning attachment is furnished, if desired, with which tapers up to 4 in. to the foot can be turned without disturbing the centres. Extreme swing over carriage is 15¾ in. This tool is made by John L. Bogert, Flushing, N. Y.



IMPROVED 21-INCH ENGINE LATHE.

Made by MR. J. L. BOGART, *Flushing, N. Y.*

Shipbuilding in the United States.

The last report of the Commissioner of Navigation shows that the tonnage of iron vessels built in the United States in the fiscal year 1889 was 53,513 tons. This was our largest output. In 1886 we built 14,908 tons, our smallest output since 1877, and excepting that year, since 1872. The total tonnage built in the United States during the last fiscal year was 231,134, as against 95,453 in 1886. In England the tonnage launched has been: In 1886, 481,233; in 1887, 577,327; 1888, 941,439, and in 1889 1,346,615 tons, and there were orders in British shipyards at the commencement of the year for nearly a million and a quarter tons. The English shipbuilding boom, however, has apparently run out, and orders for the present have almost entirely ceased, though it is hoped that some of the large steamship companies will give out orders as soon as prices fall.

In this country we seem, both on the seacoast and on the lakes, to be increasing our plants for shipbuilding at a rapid rate, and all yards, whether adapted for steel or wood, are understood to be full of orders for the Atlantic coast. Huntington's large yard is approaching completion, and the Pennsylvania Steel Co., at Sparrow's Point, near Baltimore, is pushing forward another large yard. All of the Delaware River yards are being enlarged, and old yards near Boston are being refitted. Even at Bath, where wooden shipbuilding has been so long the sole industry, preparations are being made to construct steel vessels, and new yards are being opened at places which heretofore have never built ships.

On the lakes, where heavy shipments of iron ore have been added to the ordinary grain and timber traffic, a yard has been started at Chicago capable of building twelve vessels a year, and the Duluth yard, which lately attracted attention by giving an order for 5,000 tons of steel at once, proposes "to turn out a completed vessel every thirty days." The lake vessels now building are great improvements on the so-called "grain tanks" of a former period, and they are as well-built and engined a class of vessels as can be found anywhere carrying, 3,000 tons on 15 ft. of water.

A late number of *Industries* (London) said: "The shipping industry is one which involves the welfare of almost all the other industries in the country." It might have gone further and said that during the past two years it had been the prime factor in "the growing and bounding prosperity" of Great Britain, a prosperity which seems checked by the absence of present orders. Shipbuilding, even if we should again attain the position we held up to about 1855 as the first shipbuilding country, will never be so important to the industries of this country as it has been to those of Great Britain, but its increase would give a larger additional tonnage to our railroads, and annually put many million dollars in circulation in this country.

Form of Joint Card—Western Railway Club.

Your committee, appointed at a special meeting held at the rooms of the Western Railway Club, Jan. 21, 1890, to recommend a joint card and a set of rules to govern the use of such card, in order to facilitate the prompt handling of loaded and empty cars between the lines centering in Chicago, beg to submit the following:

1. The roads subscribing agree to the use of a "Chicago joint card," which may be applied by the receiving road for such old defects or mixed material that do not render the car unsafe to run or unsafe to trainmen.

2. The joint card shall be 3½ × 8 in., yellow in color, with black letters, printed on both sides, and of the following form:

CHICAGO JOINT CARD.

(*Name of Road.*) Received.....Car No.....

From.....*Date*.....189

With following defects:.....

.....

Fill in old defects or mixed material on both sides with ink or indelible pencil.

Attach this card securely to the intermediate sill between the two cross-tie timbers

.....

Chicago Inspector.

3. The "joint card" is to be used only in cases where the delivering company's inspector is located so far from the receiving road that it is impracticable to procure a regular M. C. B. card, or when the defects are of the nature explained in rule 1.

4. The card is to be filled out on both sides, with ink or indelible pencil, and to be attached securely to the intermediate sill between the two cross-tie timbers, and may be removed by the company applying it, when the car is returned.

5. It is distinctly understood that this "joint card" is not, in any way, intended to conflict with the regular M. C. B. card. The railroad company issuing the card may be called upon to pay bills should any non-subscriber to these rules render them.

6. These rules shall be binding, on each subscriber, for six months from March 1; at the end of that time any railroad company may withdraw from the agreement by giving 30 days' notice of such withdrawal.

7. Any railroad company may become a party to these rules by notifying the secretary of the Western Railway Club.

PETER H. PECK, C. & W. I. R. R.,
R. D. SMITH, C., B. & Q. R. R.,
R. WHARTON, C. & N. W. Ry.,
Committee.

The "Standard" Coupler.

The new design of automatic vertical plane car coupler made by the Standard Car Coupling Co. of Troy, N. Y., for 1,000 freight cars on the New York Central has just been tested at the department of tests and experiments, in charge of Mr. N. O. Olson, engineer, at 84 Thomas street, New York City. The tests were made on a Fairbanks testing machine of 350,000 lbs. capacity. The following is an extract of the official report of the tests:

Date: Feb. 19, 1890.
Material: Malleable iron and cast steel.
Shape. M. C. B. Standard vertical plane automatic car coupler.
Conditions: Locked together as in service and pulled apart.

Test No. 1	Knuckle	broke at	118,440	lbs.
" " 2	"	" "	106,800	"
" " 3	"	" "	110,280	"
" " 4	Pin	" "	98,960	"
" " 5	"	" "	108,560	"

In the different tests there were used knuckles, pins and heads of different makes and material. This accounts for the differences in the ultimate breaking stress.

In tests No. 4 and 5 mallable iron pins were substituted for the steel ones generally used.

At the same time that the Standard car couplers were tested other tests were made of links and pins. The results of three tests of links showed their ultimate strength to be 46,240 lbs., 48,360 lbs. and 68,360 lbs. respectively. Also, other makes of automatic vertical plane couplers have been pulled in this machine for the purpose of determining the strength of the Standard in comparison with other designs. As a result of these tests the new design of the Standard is believed to be strong enough to warrant putting it in service. The pins used will be all of steel, and the knuckles of cast steel. Although these tests are satisfactory to the company, yet they are having made a knuckle that will give a tensile strength of about 120,000 lbs., but which will weigh several pounds less than the present ones.

Opening of the Forth Bridge.

The Forth bridge was opened March 4 by the Prince of Wales, with great ceremony. Many railroad officers and noted engineers were present. An immense crowd of spectators witnessed the ceremony. The day was observed as a holiday in Edinburgh, in honor of the occasion. Baronetcies have been conferred upon Mr. Thompson, the Chairman of the Forth Bridge Co., and Sir John Fowler. Mr. Baker, the engineer of the bridge, and Mr. Arrol, the contractor, have been knighted.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

We show in another column the form of clearance card in use on the Chicago & Alton, together with some observations by a dispatcher of that road. Our correspondent seems to think that the Time Convention did not properly consider this matter, but we do not agree with him. The committee approved a form of clearance, and it is shown with the standard code. As there are many terminals and ends of double track where it would not be deemed best, or even practicable, to require the operator to supervise the departure of trains in this manner, the Convention very properly left the point to be provided for on the time table. This is what is done. The time tables of roads managed by members of the train-rule committee show paragraphs prescribing at what points trains must invariably ask for orders. This plan would provide for the practice of the Alton. We think the Alton card should require the conductor, in more explicit language, to go to the telegraph office to get his clearance. Certainly it cannot be intended to make the operator hunt up the conductor. The form seems to find its most important use as a vehicle for conveying a written communication from the operator to the engineer, who is not required to go to the office. On this point there is also room for discussion. Let us look at it from the engineer's standpoint. Do I want a telegraph operator, possibly young and inexperienced, to fill out a card for me in a routine fashion, or had I better go to the office and question him critically concerning what trains are due? If I am of a cautious turn of mind and remember such cases as Kokomo, I shall probably decide to pursue the latter course. Engineers who are not naturally cautious need the attention of the superintendent.

A recent newspaper dispatch from Amsterdam, N. Y., states that the local courts have discharged 25 prisoners, mostly tramps, from the county jail. A "jail delivery," it is called, the indictments being virtually quashed. The men had been arrested for unlawfully riding on trains and jumping on and off whenever they pleased; and it appears that the action of the judges is in response to an alleged public demand that these offenders should not be supported in prison at the expense of the county. This is only another example of the way railroads have been thwarted in their attempts at enforcing the law against trespassers in various parts of New York state. Railroad officers find it hard enough in any part of the country to get rid of the lawless men and boys—reputable and disreputable—who infest freight yards, make the trainmen a great deal of trouble and get themselves killed; but where local magistrates are elected by popular vote their courage seems particularly weak, and it is a thankless task to try to suppress trespassing. And yet this is just the point where action must begin if the numerous fatalities and attempts at train wrecking, which regularly appear in the news columns of the daily press, are to be abated. The railroads have an expensive and unpleasant burden at best. A large proportion of the men who are killed while walking on the track are comparatively inoffensive tramps, who cannot be arrested and given long sentences, because their offense is not flagrant. Their normal place is in the poor house, but the railroads cannot send them there. Many of the offenders in yards and at country stations are persons who may not be classed as wilful law-breakers, and there is some justification for the view held by local magistrates that they should not be made to suffer imprisonment, but should be let off with fines. Even greater leniency would perhaps in many cases be sufficiently effectual. Many mild culprits could be let off on giving light bonds for good behavior. But the law should be enforced, and magistrates and railroad officers should co-operate. Offenders whom it is not deemed necessary to imprison should be given a trial on the same day they are taken in order to give them a chance to get bail. In making a raid on habitual local offenders, vagrants who are known to deserve a six months' sentence should be omitted and taken at another time.

In the newer regions of the West it is hard to find good men for railroad work, and the interests of the service suffer accordingly. A correspondent tells, in another column, of some of the difficulties with which a Utah superintendent has to contend. In one sense the remedy for the troubles he recounts is a simple one, and he suggests it himself, to wit, pay your men as well as the mines pay them. Nothing is plainer than that the law of supply and demand will quickly transfer men from one calling or trade to another under such circumstances; and where gold can be picked up by the roadside without any risk or responsibility it follows that to keep men at work where they must both bear responsibilities and run some risks, it is necessary to pay even more than can be got in the mines, if one would retain energetic men. As intimated by our correspondent, questions of this kind arise on Eastern as well as Western roads. A company which pays its division master mechanics or road foremen of engines only about as much as the best runners earn—or perhaps less, as is true in some cases—should deem itself lucky if it gets anything better than half-hearted service in return. It is peculiarly true that a railroad is a railroad wherever you find it. Tracks have been laid in all parts of the civilized world, and the engine is puffing in many regions where banks can be run by thieves who would not be tolerated even in New York City, and the gospel is dispensed by men who would scarcely be recognized by "the cloth" in more enlightened communities; but a railroad requires just as good men in China or Patagonia as in England or Pennsylvania. In fact, in mechanical matters this truth is recognized. To get a satisfactory locomotive, or passenger car the best markets of the world are sought out and their products secured, whatever the expense of transportation. To get satisfactory service the same principle must be applied to the personnel. Instead of waiting for good men to come and offer themselves they must be sent for. A hotel or a store can be run in the Rocky Mountains by men too rough or too reckless to perform the same offices in the east, but the eastern railroad director who assumes that the same rule applies to train and station management simply cheats himself. If the necessity of elevating the standard of efficiency on western roads to a level with that in the east is not always apparent, it is because the east itself tolerates in many places too low a standard.

Vice-President Holcomb, of the Union Pacific, has instructed General Managers and heads of departments that hereafter, in selecting men to fill positions made vacant by resignation or other cause, they will consider for such places men who are already in the employ of the company. If they know of no suitable man on their own division, they are to refer the matter to the Vice-President. This is to be commended and ought to be imitated. Not that hundreds of managers have not already adopted a similar position, but that the fact ought to be more definitely set forth. Simply publishing through newspaper interviews that "the company believes in civil service methods" is not enough. When employés see the exceptions to the rule, which are numerous enough, in reality, where directors' nephews are plenty, and which are still more so in the employé's view when he is too short-sighted to see all the reasons making it necessary to "jump" old-timers in making promotions, they are apt to think that their superiors intend to deceive them. The definite announcement of a policy makes it more necessary to live up to it, but that will be a good thing. Even if it sometimes necessitates explanation to subordinates of an apparent deviation from the standard, no harm will ensue. The reasons for not promoting a man are often of such a nature that one does not like to state them to him in plain words, but there would be no harm in giving a little more publicity to the motives that govern in making selections. If a fireman fails of promotion simply because he is quarrelsome or lazy, or for some other one fault, the knowledge that those points weighed against him might lead him to self-improvement, and the company thus be saved the expense of training another green man. If a trainman is made conductor because he is particularly neat in his dress, or quiet in his manners, or a good penman, and *not* because he is a better conductor than a half dozen others of equal length of service who have been considered, a plain statement of the fact that reasons of this kind decide such cases might lead to a change in the conduct of the slovenly ones. It is to be remembered that practically a *small* difference in these things turns the balance. We are not speaking of men whose defects are too glaring to be cured. These matters may be explained to men in circulars and in other ways not offensively personal. The point is to make the statements definite and emphatic and to repeat them often enough to keep them in the minds of both sides. Some of the strong phrases used by retiring officers in expressing their love and admiration for their subordinates might well afford ideas, if not words, for more frequent communications by officers who do not intend to retire for 20 or 30 years yet.

Brake Legislation and the Air Brake.

The letter on brake legislation which appears in another column might be misleading if hastily read, and ought not to pass unnoticed.

Probably our position as regards any legislation for regulating the use of safety appliances is sufficiently well known not to need restatement. It is simply that legislation will do more harm than good, but that it is likely to come before long. Whatever one's notions may be as to the wisdom or foolishness of attempting to control the policy of the railroads in technical matters by making laws, he may think it his duty to do what he can to give inevitable legislation the right direction; that is, to help to shape legislation so that it shall produce the maximum of good and the minimum of harm. To that end we have urged that the law should provide that, whatever continuous brake is adopted, it should interchange with the Westinghouse. A large number of letters from prominent railroad officers all over the country coincide with this idea, and we have not yet received one that objects to it. Obviously this must be so. A multiplication of radically different types would be a misfortune. Whatever is done, freight cars must be freely interchangeable.

Whether or not such a provision is incorporated in the law, the result will probably be about the same. The automatic air brake is now firmly established as the standard of the country, and there is small likelihood of any road putting on anything else. If it does, its cars will not be accepted to run over other roads; or if they are, they will have to be piped to run in air-braked trains. We do not object, therefore, to the clause in the Flower bill with which Mr. Howard finds fault. The really important point that he makes is that it would give a monopoly to one maker. To this there is an obvious answer. It is probable that the certainty that a great amount of freight train brake material must be turned out within a few years would put several other makers into the field. There are at this moment three or four schemes on foot, of a good deal of promise, to start new air brake companies. The probability that any one or more of them will soon be competing for this business may not be great, but at least the possibility is sufficient to stimulate the present makers to every effort to improve their apparatus, cheapen its cost and make reasonable contracts with the railroad companies. To-day there is no complaint of the quality of the material furnished by the Westinghouse company, and it appears to have been the constant policy of that company to keep the price as low as is compatible with the highest class of mechanical work. It is but very lately that the company reduced its whole schedule of prices with no other apparent object than to stimulate sales and to keep the profit so low that there would be no ground for complaint against a monopoly, and no standing inducement for others to put a great capital into the business.

We began by saying that Mr. Howard's letter might be misleading. If read hastily it would be misleading

in the deduction that because the ratio of collisions to all train accidents has apparently increased in the last 17 years, therefore the air brake is inefficient. Taking his figures as they stand, one might conclude that we were better off with the hand brake. Obviously there is a fallacy here. In fact, there are so many fallacies that it is hard to know where to begin with them. In the first place, the statistics of 17 years ago are much less complete than those of later years, and any comparison between them is dangerous. Unfortunately, we have no statistics of train mileage going back so far, but unquestionably we should find if we had that all accidents have diminished greatly in proportion to the traffic.

Among other accidents collisions have decreased. If the collisions have not decreased as rapidly as have accidents of other classes, it argues nothing against the efficiency of the brake. Great improvements have been made in track and rolling stock. We lately found that in seven years the decrease in derailments from defects of road had been 46 per cent. That is the decrease per train mile. This indicates a very great improvement in track. So great an improvement in material and machinery is not indicated by the accident statistics, but undoubtedly it has been great.

If collisions are relatively more numerous than they were 17 years ago or 10 years ago (if their ratio to all accidents is greater) we need not be surprised. It is not that the brake is a failure, but that in spite of its acknowledged efficiency, and to a great degree as a result of it, the demands upon it have increased about as rapidly as it has been improved. The weight and speed of trains have increased, engine runners have learned to take less distance in making stops, and the intervals between trains have been reduced. While these things are true of passenger trains equipped with air brakes they are also true of freight trains which are generally still controlled by hand brakes, or at best by hand brakes and driver brakes. Moreover, while the density of traffic and the weight and speed of trains have gone on increasing year by year, the protection by signals has not grown correspondingly. The lines provided with block signals are still very few. Interlocking has made faster progress, but it is still unseen on most of the roads of the country, and generally used on but very few. That collisions should now be a greater percentage of all accidents than a dozen years ago ought to be expected. If passenger trains only were considered, the percentage would very likely be found to have fallen rather than increasd.

This leads to the consideration of another fallacy in Mr. Howard's letter. He says that in our record of January accidents there appear 171 train accidents, of which 44 per cent. were collisions and 39 involved passenger trains. When these accidents are examined it will be seen that in eight cases freight engines ran into the rear or side of passenger trains. In these cases the brake equipment of the passenger cars could have made no difference. In nine cases there were butting collisions between freight and passenger trains. How many of these could have been avoided had the passenger trains been stopped instantly we cannot tell. In six cases the collisions came from misplaced switches, and it is safe to assume that the switches were not protected by distant signals. None of these cases give on the face of them any reason to suspect that the passenger train brakes were inefficient. In none of the others is there anything to show that there was or was not any failure of the brakes. All this part of the argument is gratuitous assumption.

That accidents do happen sometimes from failure of the air brakes to stop trains within the limits of time and distance which may reasonably be set for really efficient passenger train brakes we all know; but when such accidents are investigated to the bottom we find that the brake beams, or the gear, or both, were too light for the service demanded; or that the lost motion from wear of shoes and various parts of the foundation rigging and from other causes was considerable; or that there was a heavy engine without a driver brake, or probably a combination of all these defects. These things we have preached against time and again, but they still recur. But they are no defect of the air brake. Is it supposable that a brake taking its motion from the drawbar or the axle would be free from them? Is it not likely that it would be more liable to them than is the air brake? The air brake will, of course, be improved in details, but to-day there does not seem to be any prospect that the principle will be improved upon or superseded. On the contrary, that prospect is more remote than it has been at any time in the last 10 years. Even the wonderful development of the applications of electricity has not brought forward an electric brake that can compare in all the essential elements of simplicity, durability and efficiency with the air brake. But the work of equipping freight cars with automatic power brakes is now well under way, and will go on with increasing rapidity, and it would be irrational to delay or complicate the work by introducing new types which are at best only in the experimental stage.

Party Rates.

The Inter-state Commerce Commission holds that it is illegal to charge lower rates for a party than for the same number of individuals separately. This decision will cause no surprise, even among those who are inclined to doubt its wisdom. It was clearly foreshadowed in a memorandum filed about a year ago, when the point at issue was practically decided, though no complaint had as yet been brought. It is in line with the whole series of passenger rate decisions, in all of which the Commission has been disposed to narrow the sphere of permissible discrimination within the strictest possible limits. We are not prepared to say that this action is unwise; but we think that parts of the reasoning adduced in its support are somewhat ill considered. Certain principles, as it seems to us, have been stated in so broad a form that it will not be easy to maintain them against a skillful challenger.

The Commission contends that, with the law as it stands, party rates are distinctly forbidden; and that Congress was wise in refusing to make exceptions in favor of parties, like those in favor of mileage or commutation tickets, because any such privilege would certainly be abused by speculators. Here are two separate and independent positions; first, that the law distinctly forbids party rates, and second, that it would involve serious dangers to have the law otherwise. The first is much the more important; the second is only incidentally brought forward.

Is the law really so explicit? The prohibition of discrimination with regard to passengers is precisely the same as that with regard to freight.

"If any common carrier subject to the provisions of this act shall, directly or indirectly, by any special rate, rebate, drawback or other device, charge, demand, collect or receive from any person or persons a greater or less compensation for any service rendered, or to be rendered, in the transportation of passengers or property, subject to the provisions of this act, than it charges, demands, collects, or receives from any other person or persons for doing for him or them a like and contemporaneous service in the transportation of a like kind of traffic *under substantially similar circumstances and conditions*, such common carrier shall be deemed guilty of unjust discrimination, which is hereby prohibited and declared to be unlawful."

The expression "under substantially similar circumstances and conditions" applies exactly as much to passenger as to freight business. The phrase was, as the Commissioners have more than once said, carefully chosen. It hardly warrants the statement in the present decision that "the design of the Act to Regulate Commerce was to put each individual in the matter of transportation, on exact equality, with only such exceptions as the *Act itself specified*." The act does not specify that carloads may be charged at different rates from parcels. It does not, and could not, specify a hundred other exceptions which are necessary to good railroad economy. The Louisville & Nashville decision distinctly repudiated the specific exception theory, and took the broader ground of elastic interpretation. "Beyond question *the carrier must judge for itself* what are the 'substantially similar circumstances and conditions' which preclude the special rate, rebate, or drawback which is made unlawful by the second section, since no tribunal is empowered to judge for it until after the carrier has acted, and then only for the purpose of determining whether its action constitutes a violation of law." The broad ground of common sense thus taken was a source of strength for the Commissioners. They have carried out this idea in the matter of freight charges, in interpreting the second and third sections of the act as well as in the fourth. For some reason they adopt very different methods when they deal with passenger business. Such a course seems at once weak and inconsistent.

The inconsistency appears all the stronger when we come down to details. In the case of *Rice, Robinson & Witherop vs. R. R.* (II. Int. Com. 389) we have in some respects an extremely close parallel to the matter in hand. Complaint was made of discrimination in oil rates, because the charge was very different in two cases where the actual haul was nearly the same. "Where it appears that in one case there are expensive terminal charges, while in the other these terminal charges are far less considerable, the circumstances and conditions which control the making of rates in each instance are substantially dissimilar." Such were the words of the Inter-state Commerce Commission. Why apply the rule to freight, and refuse to apply it to passengers? Why does not a difference in terminal expense constitute a difference in one case as well as in the other?

It may be contended that the saving is large in the case of freight terminals, and small in the case of passengers. We doubt whether this distinction can be fully maintained. The aggregate expense, direct and incidental, of selling passengers their tickets, bears no small proportion to the aggregate expense of passenger train movement. A system under which the passengers buy their tickets together instead of seperately has a close analogy to the case where freight is shipped by carloads instead of by parcels. It is a gain to the road to have its terminal expenses attended to in bulk. A road will ship freight at carload rates, even if it belongs to several shippers, provided it is furnished in such a way that it can be dealt with all at once. There doubtless are differences of principle between the carload rate for freight and the party rate for passengers; but there seems to be no such sharp dividing line as would warrant us in condemning the latter almost unheard, as being obviously contrary to the law under which the former are permitted.

If mileage tickets have any justification at all, it must be because the saving of trouble at stations is a matter of real importance. All the reasons which favor mileage tickets can be urged with more or less force in favor of party rates. The objections to the latter apply to the former also. Mileage tickets good for bearer are freely transferable, and can be used as a means of making one man pay less than another. They have not been attended with any great abuses. Their abuse by ticket brokers in the West has resulted largely from the willingness of the roads and the unreasonably large difference between mileage rates and those for single tickets. We do not believe that, with anything like proper safeguards, party rates would be abused. Still less can we believe that Congress, in specifically naming mileage tickets as exempt from the prohibition of the Act, meant thereby to forbid other things of the same sort, which might have been allowed under the general section against discrimination. It may prevent giving special rates to a theatrical party, as such; it can hardly prevent a railroad man from taking account of the "special circumstances and conditions" of such parties as distinct from those of individual travelers.

We doubt whether the conditions would warrant anything like the amount of discrimination which has sometimes been made in favor of theatrical parties, or which they are disposed to claim at present. We are not sure but what a pretty rigid prohibition, as enforced by the Commission, may, on the whole, do good. But we cannot acquiesce in the grounds of this prohibition, or admit that the second section of the Act to Regulate Commerce warrants the sweeping construction which the Commission gives it. It will hardly do to interpret it in one way for freight and in in another way for passengers, when its words apply indiscriminately to both. Yet the Commission seems to have committed itself to this difference of policy in the two lines—broad in the one case, narrow in the other. An interpretation divided against itself canno stand.

Mathematics of the Compound Locomotive, from French Studies.

The mathematical investigation of that much-dispute subject "the most desirable dimensions of the high and low pressure cylinders of compound locomotives" made by the engineers of the Paris, Lyons & Mediterranean are particularly interesting, owing to their simplicity The following are extracts therefrom:

In this consideration the expressions refer to the use of two cylinders only, the formula being by them considered to be the same whether one or two high or low pressure cylinders are used.

The volume of the large cylinder is determined by the quantity of steam which will be given out at the pressure found at end of expansion and discharged into the chimney at the different speeds of the train. From this point of view the volume of the small cylinder must be large enough to transmit all of the vapor produced in the boiler at the slowest speed at which the locomotive will be called upon to develop all its power; but this fixes only one minimum. To determine completely the volumes, it is necessary to study the other considerations which determine at the same time the best relation to be established between the degrees of admission in each of the two cylinders.

No notice seems to have been taken of the fact that a locomotive cannot develop its full power at slow speeds, because not a sufficient amount of fuel would be burned upon the grates to permit it. However, the following mathematical discussion is not based thereon:

In the formula which follows the letters represent the quantities here designated:

V = volume of the small cylinder.

U = volume of the large cylinder.

K = ratio between the volume of the large and small cylinders $= \frac{V}{U}$

e = percentage of cut-off in the small cylinders.

F = percentage of cut-off in the large cylinders.

P = absolute pressure of admission in small cylinders, which is supposed in these formulæ to remain constant during the period of admission.

h = absolute pressure at the end of expansion in the small cylinder at the time of the opening of the exhaust.

p = absolute pressure in the reservoir, and is supposed to be constant during a whole revolution of the wheels.

p_1 = absolute pressure in the large cylinder at the time of the opening of the exhaust.

p_2 = back pressure in the low-pressure cylinder.

Now, if one seeks to equalize the work in the small and large cylinder, one reasons in the following manner: The work developed in the small cylinder has an approximate value

$$e\,P\,K\,U\left(1 - 2{,}3026 \log. e - \frac{p}{P\,e}\right).$$

In the same manner the work developed in a large cylinder has an approximate value

$$F\,p\,U\left(1 - 2{,}3026 \log. F - \frac{p_2}{p\,F}\right).$$

Placing these values equal to each other, the following is obtained, remembering meanwhile that, according to the approximate law of Mariotte,

$$P\,e = h = \frac{p\,F}{K} \text{ and } p\,F = p_1;$$

$$e\,P\,K\left(2{,}3026 \text{ log. } \frac{F}{e} - \frac{K}{F}\right) + p_2 = 0, \text{ and}$$

$$p_1\left(2{,}3026 \log. \frac{F\,K\,P}{p_1} - \frac{K}{F}\right) + p_2 = 0.$$

These give the value of F for each value of e or p_1.

If, however, it be desired, instead of equalizing the work in the two cylinders, to remove all fall of pressure when the high-pressure cylinder opens into the reservoir, then h must equal p. This is produced by making F equal to K.

One may equally desire to obtain a constant pressure in the intermediate reservoir for all variations of cut-off in the high-pressure cylinder, and such that the difference between the initial temperature and the final temperature is the same in the small and large cylinder. These conditions exist when

$$F = \frac{P\,K\,e}{p}.$$

It is easy to see that we cannot satisfy the three preceding conditions for all values of e, because the second condition requires that F remains constant for each value of e; the third condition that F increases in proportion to e, and the first that F varies, and according to other laws yet.

For locomotives having four cylinders, as those represented by our designs, we are most interested to satisfy, as nearly as possible, the first condition, which is the equality of work in the small and large cylinders. To do this completely for each value of e, we must give to F the values found from the following equation:

$$e\,P\,K\left(2{,}3026 \log. \frac{F}{e} - \frac{K}{F}\right) + p_2 = 0.$$

But this is not ordinarily possible except for the middle values of e, because when e has increased beyond certain limits the equations give values of F greater than unity, which is absurd, because by definition F is a fraction. When, on the other hand, e diminishes, the equation gives values of F smaller and smaller until it would become inferior to K. There are serious inconveniences when F is made less than K, and by it p would be greater than h. That is to say, the pressure in the intermediate reservoir would be greater than that in the small cylinder, and at the moment of the opening of the exhaust steam would rush into the small cylinder from the reservoir and produce wasteful results. After continued study we have arrived at the following:

Take the values of F, determined by the above equation when they are greater than K and less than a certain fraction, which depends upon the valve motion employed, but which ordinarily is not exceeding $\frac{5}{10}$.

Take F equal K for all values of e, for which the equation makes F less than K.

Consider F equal to $\frac{5}{10}$ for all values of e for which the equation would give F greater than $\frac{5}{10}$

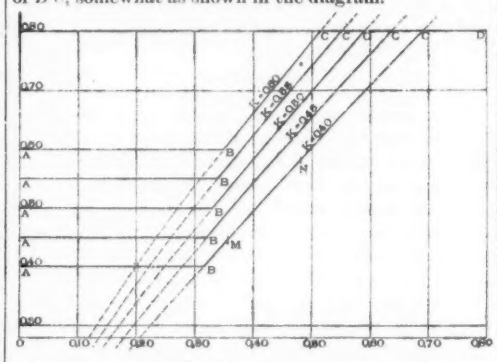
These results are represented graphically in the accompanying diagram, the abscissas of which are the values of e, and the ordinates the values F.

The relations between the cut-off in the two cylinders are shown by the lines $A\,B\,C\,D$ composed as follows: First, the lines $A\,B$ give the values of F as constant, when they would be less than K according to equation for values of e from 0 to about $\frac{35}{100}$, as shown by the diagram.

Second, the lines $B\,C$ give the values of K determined from the equation for what may be termed middle values of e.

Third, the lines $C\,D$ show the constant value of F when the values of e are such that the equation would make F greater than $\frac{5}{10}$.

In studying to determine the most desirable size of cylinders to use, it is best that the points, such as $N\,M$, be located on the diagram to show the variations in the average working capacity of the locomotive, and it is best, in order to reduce the fall of pressure between the high-pressure cylinder and the intermediate reservoir, to locate these points nearer to B than to C on the line of $B\,C$, somewhat as shown in the diagram.



It will be noticed that the French engineers have decided that the ratio of cut-off must vary in the two cylinders according to, but not regularly with, the variations in the cut-off in the high-pressure cylinder. Therefore, from their standpoint, there is no constant ratio between the cut-offs in the high and low pressure cylinder, and to meet this condition they have designed a peculiar steam reversing gear, which by a cam action enables them to regulate the cut-offs, as desired, in either cylinder independently by a change in the form of the cams.

One of the "labor" journals has reprinted a circular lately issued by the Illinois Central warning its employés of the dangers to which they are liable when working on freight trains. The circular is signed by the General Manager, and is supplemented by a blank agreement to be signed by the employé. The document is notable chiefly on account of its length and the evident purpose of its composer to cover all possible points on which an injured employé could base a claim against the company for damages in case of injury to his person. The phrases are similar to those seen in a great many rule books and time tables, but there is a much larger number of them. The journal which prints this circular comments upon it severely. Because brakemen are warned against loose ladder rounds it is assumed that the company does not intend to keep those parts in repair, and the clause cautioning men against catching their feet in frogs is construed to mean that the company does not intend to maintain foot guards. Of course this talk is largely clap-trap. There are two sides to the question, as every one knows, and the railroad company can very plausibly claim that these excessively cautious provisions are simply to provide against unjust damage suits, which every railroad man knows are constantly being brought, and, by the aid of prejudiced juries, successfully prosecuted. There is one point, however, on which the road might well have taken a different course. One of the agreements signed by the employé is, to "obey all rules now in force and that may hereafter be made." It cannot be said that this is technically unjust, because every employé who is not willing to abide by the rules might fairly be asked to tender his resignation; but every railroad president or superintendent, and every railroad lawyer, knows that the courts will not sustain the company against its men on any rule that is not regarded by a judge and jury as reasonable. An employé cannot legally exempt a company from the reasonable performance of its duty toward him, and it would have been only fair to have inserted in the above quoted phrase the word "reasonable." This would, to be sure, be incompatible with the dignity of the usual superintendent's circular; but superintendents who have kept pace with the progress of the times, and who have noted the utterances of such men as Charles Francis Adams, Cornelius Vanderbilt, E. T. Jeffery and others, must know that there is dignity to be maintained on both sides. An employé sacrifices as much in submitting to an order which is overbearing in terms as does a superior in admitting that his subordinates have a right to question his acts; most people would say a great deal more. An iron hand is necessary in railroad management, but the insertion in circulars of such sentences as we have quoted is a needless exposure of it without the velvet glove.

The Kansas City, Wyandotte & Northwestern has complained to the Interstate Commerce Commission that the Burlington & Missouri River and the Chicago, Burlington & Quincy refuse to receive coal offered to them at Beatrice, Neb., in the complainant's cars for hauling to points in Nebraska, and that thereby the continuous carriage of the coal is prevented and complainant's business embarrassed and discriminated against. Discrimination is also effected against the Leavenworth coal mines, where the coal originated. The complaint further states that the complainants offered to pay full local tariff rates from Beatrice and also to remit mileage on their cars; this not being accepted, the further offer was made to load the coal in Burlington cars, but this, too, was refused. The local newspapers say that the Burlington refused the other companies' cars on the ground that borrowing was extravagant business for a road that owned cars, and then refused to furnish Burlington cars because they were all in use. This line of argument is somewhat peculiar, and if correctly reported would seem to be quite inconsistent. We cannot see how the position of the Burlington can be regarded as other than contrary to section 3 of the Act to regulate commerce, which provides that reasonable and equal facilities for the interchange of traffic between their respective lines shall be offered by all carriers. It is reasonable that a road should prefer to use its own cars instead of borrowing, but when it has none of its own to use, the absurdity of the claim is at once obvious. On the other hand, it is fair to use one's cars in the most profitable traffic that offers, and the commission will have before it the knotty question of deciding how cars shall be apportioned to different classes of traffic and different divisions of a road when there are not enough to supply the demands of all applicants.

Swivel truck, or bogie carriages, as they are called in England, are finding increased favor there. The Midland has some very satisfactory designs, as has also the London, Brighton & South Coast. One of the most recent carriages of this type has been introduced on the Caledonian Railway from designs by Mr. D. Drummond, Locomotive Superintendent. It was illustrated in much detail in *Engineering* of Feb. 21. These carriages have been built to meet the demands of tourist traffic. The frames and trucks of both the third and first class are alike. In the first-class cars there are six compartments, with two lavatories, each lavatory serving for two adjacent passenger compartments. The centre compartment is reserved for smokers. The train is equipped with Westinghouse automatic air brakes, Pintsch gas light and Macnee's system of electric communication between passengers, guards and driver. The frame is made of the best American white oak, parts of which are plated with steel ¼ in. thick, the head stocks with steel ⅜ in. thick. The truck frames are of mild steel ⅜ in. thick. The pivot of the truck is placed 2 in. nearer one axle than to the other, in order that one pair of wheels may guide the motion of the truck and thus do away with the sinuous movement incidental to the ordinary trucks. The wheels are 3 ft. and 9 in. in diameter, with steel tires and Mansel retaining rings. The centres are of teak. The introduction thus far of swivel truck carriages in England has brought out several novel features which are worth attention in this country, notably the simplicity of the designs.

Engineer Seth Twombly and Fireman LaCloche, who were indicted for murder in the case of the collision at Auburn Park, Sept. 27, have been acquitted. Some witnesses testified that the semaphore had not been thrown in time to allow the train to be stopped. Others, however, said that the semaphore showed red to the engineer a good time before he reached it. There was no dispute that the freight was ahead of time and running too fast, but the jury, as in many previous cases of indictment for causing collisions, doubtless were influenced by the evidence tending to show weak points in the other provisions for safety. If it is shown that other trainmen, or a switchman or a superintendent, can be blamed for any sort of misconduct or negligence in connection with a disaster, a jury will pretty surely sympathize with the prisoner, on the theory that he is to blame more than the others only in getting caught. This is natural enough, and we all might take the same view if called to pass judgment. Moreover, it might be said that the preliminary imprisonment and the five months' suspense constitute sufficient punishment; but nevertheless a verdict of acquittal gives a very wrong impression. The public, in its hasty or ill-formed judgment, probably has to conclude in such cases that being murdered by drunken engineers is one of the inevitable incidents of railroad travel.

We have received from L. L. Robinson and Sanford Robinson, of San Francisco, a communication covering cuttings from the local papers on the matter of the failure of the Walnut Grove dam. In the earlier of them Mr. Luther Wagoner (whose description of the dam we have published) says that Col. E. N. Robinson, his predecessor, was several things that an engineer ought not to be. In a later issue Mr. Wagoner qualifies what he had before said. The gentlemen who write to us are the brother and the nephew of E. N. Robinson. They say that Mr. Wagoner will probably have to explain in the courts what he did say about his predecessor, and suggest that any republication of the libels will be followed by an effort to get legal redress. As a matter of fact we had received the San Francisco papers containing the charge and partial retraction some days before this letter reached us, and had no notion of repeating matter so obviously personal, and possibly very unjust, merely on the authority of a newspaper interview. The causes of the failure of the dam and the responsibility for it will probably be accurately known in time, but with the information now available discussion of them would be of little value.

Advices from Chili state that Mr. Bernstein, who now holds the contract formerly held by the North & South

American Construction Co. for building railroads in Chili, is making fair progress with the new lines. In a recent note to the government he says that the entire rolling stock will come from Europe. The bridges, instead of being built in America, as was stipulated in the original contract, are to come from Creusot, France. A large number of new bridges for roads already in operation, to replace present structures, are of English type. Of 44 new engines, only six switching engines are American; the rest are English. Of 1,000 cars, only 200 platform cars are American, the rest English.

NEW PUBLICATIONS.

The Section of Steam Transportation in the United States National Museum. Report by J. Elfreth Watkins, Curator of the Section on Transportation.

This is a report by Mr. Watkins of the work done by this section of the United States National Museum for the year ending Jan. 30, 1886. An account is given of the preliminary scheme of organization of this bureau, with illustrations of some of the relics already collected. The object of the organization of this department of the United States National Museum is to collect originals and models of early steamboats, locomotives, track, cars, etc., also to obtain drawings and photographs of such articles, all to be arranged and catalogued in accordance with the system now in use in other sections of the museum. It is proposed also to form a library of literature bearing on the history of American railroads and to keep a catalogue of the published literature of the subject. The work which it is proposed to accomplish in this collection is one of very great interest, and which should have the hearty support of railroad men generally, and Mr. Watkins would be glad of suggestions from any one who can put him in the way of getting information or securing relics which may be of value in the collection. In 1886 a petition signed by over 1,300 persons connected with railroads in all parts of the United States was presented to Congress asking for an appropriation for this section of the National Museum. No such appropriation, however, has been made, and the work so far as it has gone has been carried on almost entirely by private enterprise. The pamphlet before us contains a copy of the petition, with a list of the signers.

New England Railroad Masters Association; Proceedings of the Seventh Annual Meeting.—This is a pamphlet containing a full report of the proceedings of the meeting held in Boston last August. A report of the meeting was published in the *Railroad Gazette* at the time, therefore no further review of the proceedings now published is necessary. The report may be had of the Secretary and Treasurer, Mr. W. F. Ellis, of the New York, Providence & Boston Railroad, Woonsocket, R. I.

TRADE CATALOGUES.

Vaile & Young's Skylights.—This is a pamphlet published by Messrs. Vaile & Young, of Baltimore, Md., to advertise their system of glazing without putty. Their devices provide not only for securing practically watertight joints without the use of putty, but for thorough drainage in case of leaking, and also for getting rid of the water from condensation on the inside of the glass. They claim that their method of construction not only avoids all difficulty from unequal expansion and contraction, but obviates any danger of breaking the glass by vibration, making it, therefore, useful for train sheds and buildings subjected to the motion of heavy machinery. Illustrations of a few applications of this method of glazing are given, particularly a picture of the union depot of the Atlantic Coast Lines at Richmond, Va., where 10,000 sq. ft. of this form of glazing is used on the passenger building, train shed and freight warehouses.

General Catalogue of Worthington's Pumping Engines, Steam Pumps and Hydraulics; Jan. 1, 1890. This catalogue contains illustrations and descriptions of a great variety of pumps made by this famous house, as well as illustrations of certain special parts. It is hardly necessary to say more than to simply call attention to the fact that this catalogue has been issued. It is of incidental interest, however, to notice that a list of places is given where Worthington's engines are used for water-works purposes, of which the total contract pumping capacity is 1,990,975,000 gals. in 24 hours.

The Thomson-Houston Electric Motor.—This is a little pamphlet showing very fair illustrations of a great many applications of this well-known motor. It is shown as applied to tramways, hoists, mining locomotives, drawbridges, printing machinery, machine shops, etc. A short description is given of the electric hoist of the mining locomotive and the drawbridge motor. The address of the Thomson-Houston Motor Co. is No. 620 Atlantic avenue, Boston, Mass.

Halsey's Specialties is a small pamphlet describing portable power drilling machines manufactured by James T. Halsey, of Morristown, N. J., the agents for which are J. J. McCabe, 121 Liberty street, New York, and Pedrick & Ayer, 1,001 Hamilton street, Philadelphia. These drills have been designed to do the same amount of work as a stationary drill press, thus saving moving heavy parts, and to have automatic and friction feed with a quick return spindle. The machines are made in three sizes. This pamphlet of fourteen pages shows their application to different classes of work and illustrates them in position.

TECHNICAL.

Locomotive Building.

The Receiver of the Houston & Texas Central has been authorized to purchase two new switching engines.

The Toledo, St. Louis & Kansas City has put in service four freight locomotives recently received.

The Brooks Locomotive Works have begun the delivery of 25 locomotives ordered by the Cleveland, Cincinnati, Chicago & St. Louis.

The Georgia, Carolina & Northern has just received two new locomotives.

The Rogers Locomotive Works have nearly completed two locomotives of an order for 26, of which 10 are to be passenger and 16 freight engines, for a narrow-gauge road in the Argentine Republic.

Two 10-wheeled passenger locomotives with 19 × 24 in. cylinders have been built by the Manchester Locomotive Works for the Boston, Concord & Montreal.

The Mexican Central has ordered 10 freight locomotives.

During the past month the Schenectady Locomotive Works completed the following locomotives: Ten 21×24 in. 65-ton consolidation freight for the Chesapeake & Ohio. Five 20×24 in. 60 ton consolidation freight for the Fall Brook Coal Co. Two 18×24 in. six-wheel switching for the Houston & Texas Central. One 18×24 in. six-wheel switching for the Elizabeth, Lexington & Big Sandy. Three 18×24 in. ten-wheel freight for the Kentucky Central. One 18×24 in. ten-wheeler for the Ohio & Big Sandy, and two 17×24 in. six-wheel switchers for the Chicago & Northwestern.

Car Notes.

The Laconia Car Co., of Laconia, N. H., is building 10 passenger cars for the Boston & Maine road.

The Houston & Texas Central will soon award contracts for building 300 box cars.

The St. Louis, Iron Mountain & Southern has just received from the shops 200 cars for carrying buggies and furniture.

The Philadelphia Car Works of the J. G. Brill Co. have shipped six narrow-gauge passenger cars to a Mexican road. The St. Augustine & North Beach, has also just received two new passenger cars and one combination passenger and baggage car from this firm.

The Buffalo Car Manufacturing Co. has just finished an order for 380 gondola coal cars for the New York, Lake Erie & Western.

Five chair cars have just been completed by the Pullman Car Co. for the Missouri Pacific, to be used on through trains between St. Louis and Denver.

Fifty dump cars and three cabooses are being built in the shops of the Lake Shore & Michigan Southern. As soon as the present order is completed work will commence on another lot of 50 dump cars.

The Peninsular Car Works Co., of Detroit, Mich., is building cars for the Denver & Rio Grande, and for the Union Pacific, equipped with air brakes; also for the Chicago, Rock Island & Pacific, and the New York, Lake Erie & Western, the latter having Janney couplers.

The Lafayette Car Co. will build the 1,000 box cars for the New York, Pennsylvania & Ohio at its Lima shops. The shops are working on 850 cars for this road, and also on orders for cars for the Cincinnati, Hamilton & Dayton, Lake Erie & Western, and Pennsylvania.

Bridge Notes.

No decision was reached at the town meeting in Willimantic, Conn., last week, held to consider the project to build another highway bridge 550 ft. long, with a 25-ft. driveway and 3-ft. footwalk, from Main to Pleasant street. It is estimated that the bridge will cost over $30,000.

The Board of Supervisors have decided to build two bridges across Sandy River, one at Stony Mill and the other at Fitzgerald mill, near Chatham, Va.

The Kansas City, Memphis & Birmingham has submitted plans for bridges over the tracks of the company at Twenty-first and Twenty-third streets in Birmingham, Ala.

J. H. Pearson, Nicholasville, Ky., Chief Engineer of the Richmond, Nicholasville, Irvine & Beattyville Railroad, has asked for proposals for the Kentucky River Bridge at Irvine, Ky., consisting of one 250-ft. span, eight 100-ft. spans and a short viaduct approach, all of iron and steel. Edwin Thacher, of Louisville, has received the contract for building seven combination bridges on the road. The contract price is $27,458. There were five other bidders.

The Board of Surveyors of Philadelphia have approved plans for bridges over the Richmond branch of the Philadelphia & Reading road, on the line of Second street, and over Cresheim Creek, on the line of McCallum street. The estimated cost of the Second street bridge is $45,000, of which the Philadelphia & Reading Co. has agreed to pay one-half, and H. H. Houston has agreed to pay $25,000, one-half the cost of the McCallum street structure.

Plans have been prepared for a steel bridge, to be built by the Wheeling Bridge Co., across the Ohio River, near Wheeling, W. Va. It is reported that the contract for building them has been let to Ferris & Knauffman, of Pittsburgh, for $452,000.

Grant Wilkins, of Atlanta, Ga., has received the contracts for the following bridge work: Five spans of 131 ft. each over Chattahoochee River, for Atlanta & West Point; one span, 162 ft., over Catoma Creek, for Western Alabama; one span, 70 ft. plate girder, over Chattahoochee River, for Macon & Birmingham. The iron work for these bridges will be made by the Passaic Rolling Mills, of Paterson, N. J.

The Milwaukee Bridge & Iron Works have commenced the erection of a long viaduct near Wauwatosa, Wis., for the Milwaukee & Wauwatosa electric road.

The city engineer of Memphis, Tenn., has recommended the building of an iron bridge over the Memphis & Charleston tracks at Madison street.

The city engineer of Rockford, Ill., is preparing plans for an iron-girder bridge at Ninth street. Another bridge is to be built across Keith Creek at Sixth street.

The Pacific Bridge Co. has the contract for a bridge 500 ft. long and 66 ft. wide, from Front street to Railroad avenue, Seattle, Wash., for $7,500.

The County Commissioners of Hardeman County, Tex., will shortly let the contract for an iron bridge to be built over the Pease River, near Quanah.

The contract for constructing the iron bridge across Rocky Creek, at Hallettsville, Tex., has been awarded to the Pittsburgh Bridge Co., at $3,690. There were five bids for the work.

The County Court at Edna, Tex., will receive bids until March 20 for the construction of two iron bridges, one across Navidad and the other across Lavaca River in Jackson County, Ten.

The City Engineer of Buffalo, N. Y., has been ordered to prepare plans for an iron bridge to be built across Scajaquada Creek at the crossing of Grant street, to replace the present 600-ft. wooden structure.

Pepper & Nunn, of Gainesville, Ga., have secured the contract for building two bridges over the Hiwasse River, near Hayesville, N. C.

The County Clerk of Saline County, Ark., has invited proposals for two 150-ft. Pratt spans and cylinder piers for the Saline River bridge, near Benton, Ark.

The upper branch of the City Council, of Wheeling, W. Va., has failed to pass the ordinance passed by the other branch providing for the submission of a loan of $150,000 to a vote, for the erection of a new bridge across the creek at Main street, the old one having been swept away by the flood in 1888. Ferris & Kauffmann, of Pittsburgh, had submitted plans for a steel bridge.

The bridge committee of Jacksonville, Fla., has awarded the contract for an iron and wooden bridge to the Groton Bridge Co., of Groton, N. Y., at $39,171.

Dean & Westbrook have finished a drawbridge at Third street, Wilmington, Del.

A new bridge has recently been completed at Elm street, Scranton, Pa., at a cost of about $14,000.

The new Pratt truss highway bridge spanning the tracks of the New York, Lake Erie & Western at Germantown, N. Y., is completed. The Riverside Iron Works, of Paterson, N. J., had the contract for the iron work, and Nolan Bros., of Reading, Pa., built the stone work. The cost of the bridge was $7,200.

G. W. Pearson will make surveys for the location of a proposed bridge across the Missouri at Kansas City, to be built by W. P. Van Aiken.

The new iron truss single-deck bridge being constructed by the Philadelphia & Reading at Manayunk Pa., is being rapidly completed by the Pencoyd Iron Works, who have the contract for the iron work.

The bridge across the Roanoke River on the Norfolk & Carolina road will be completed in a few days.

Manufacturing and Business.

The Old Colony road has given an order for a considerable number of Davies' spikes, and for a less number of Servis' tie plates. The plates will be slotted to use with the spikes. This is understood to be an experimental order.

Additional orders for a quantity of Mason air brake regulators have been received by the Mason Regulator Co., of Boston, from the Eames Vacum Brake Co. The Boston & Albany and Fitchburg roads have each over 100 of these regulators on air brake pumps. Satisfactory tests have been made on other roads, including the Baltimore & Ohio and Pennsylvania.

The Tripp Manufacturing Co., of Boston, removed March 1, to new and commodious offices in the New England Building, 180 Summer street. The company manufactures Tripp's anti-friction journal bearing, Tripp's metallic packing, and Tripp's balance valve. The officers now are: Albert A. Folsom, President; Converse J. Smith, Vice-President and General Manager; John E. Blakemore, Treasurer; Samuel A. Randall, Superintendent.

The St. Thomas Car Wheel Co., of St. Thomas, Ont., has been incorporated with a capital stock of $250,000, to manufacture cast iron and steel car wheels, iron and steel and brass castings, and to build machine shops for making tools for iron and steel foundries. The incorporators are P. H. Griffin and John Fleming, of Buffalo, N. Y.; T. F. Griffin and C. Sheedy, of Detroit, Mich., and T. A. Griffin, of Chicago, Ill.

The Chicago & West Michigan Road has placed an order for 150 Scarritt seats with the Scarritt Furniture Co., of St. Louis.

The Priest Snow Flanger Co. has been incorporated in Wisconsin, with headquarters at West Superior, by A. F. Priest, W. F. Mattes, and J. F. Ware. The capital stock is $200,000.

The Grimes Valve Gear Co. has been chartered in Illinois to manufacture locomotive valve gear. The incorporators are: Walter F. Render, Frederick S. Steadman and Adrian I. Roberts.

The Southern Railroad Construction Co. has been organized for the purpose of negotiating securities, placing bonds and building railroads, waterworks and other public enterprises in the Southern States. The capital is $500,000. The following officers have been elected: President, Gov. John B. Gordon, of Georgia; Vice-Presidents, Charles A. Brooks, of New York, and C. O. Beede, of Lynn, Mass.; General Manager, Charles Danforth, of New York; Secretary and Treasurer, Roland C. Cook, of Chattanooga. The company will have offices at 57 Broadway, New York; 327 Fifth street, Louisville, Ky., and the Richardson block, Chattanooga.

The Piedmont Construction & Development Co. has been chartered in Virginia by George O. Moore, J. M. Moore, R. F. Hill, T. S. Martin, C. C. Dunn, A. N. Peyton, J. W. Yates, J. S. B. Thompson, T. O. Troy, H. Hiden, L. D. Scott and C. M. Borum, to construct and equip railroads.

The Mexican Railway Development Co. has been incorporated in Illinois to construct and equip railroads in Mexico. The capital stock is $100,000, and M. Masterson and W. O. Robinson are incorporators.

The New York office of the Pencoyd Bridge & Construction Co. has been removed to No. 192 Broadway, Room 42. The New York office of the Jersey City Wheel Foundry & Machine Works has also been removed to No. 192 Broadway.

The American Continuous Draw Bar Co., of Aurora, Ind., report that the drawbar is being applied by the Illinois Central to 500 cars being built by Wells & French, and to 350 cars being built in its own shops. The Indianapolis Car Co. is applying it to 350 cars under construction for the Pittsburgh & Western, and 310 cars for the Choctaw Coal & Railway Co. Pennock Bros., of Minerva, are equipping 600 cars for the Pittsburgh & Western with it. The Baltimore & Ohio has applied it to 390 cars just finished, and Baltimore & Ohio Southwestern will apply it to 900 cars to be built at the company's shops.

Iron and Steel.

The second of the three large anthracite blast furnaces of the Brooke Iron Co., at Birdsboro, Pa., has resumed operations after a long idleness.

The Latrobe Steel Works, of Latrobe, Pa., have placed the order for a new 85-ton hydraulic tire mill with William Tod & Co., of Youngstown, Ohio.

W. Clark's Son & Co.'s new open-hearth plant is nearly completed, and will begin operation in a few weeks.

The Union Iron Works, of San Francisco, has purchased the iron works of the Pacific Mail Steamship Co., which it has maintained for many years, for the purpose of repairing its steamers.

J. P. Witherow & Co., of Pittsburgh, have commenced the erection of a new furnace at Florence, Ala., which will have a capacity of 200 tons per day when completed.

Riter & Conley, of Pittsburgh, are erecting the Clifton Iron Company's iron furnace at Ironton, Ala., and a new coke furnace being built by Philadelphia parties at Max Meadows, Va.

The Vulcan Mill, formerly owned by Long & Co., of Pittsburgh, will be put in operation early in March by the Lockhart Iron & Steel Co. The product of the mill will be similar to that formerly turned out.

The Rail Market.

Steel Rails.—Eastern mills, $34.50@$35; Chicago, $36.50 @$37.50. Sales for the week have been light.

Old Rails.—Little business is reported. A small lot was sold at Pittsburgh for $26.

Track Fastenings.—Angle plates, 2.10c.@2.15c.; bolts and nuts, 3.10@3.25c. for square or for hexagon nuts; spikes, 2.15@2.25c.

Electric Welding.

A board of naval officers was formed by order of the Secretary of the Navy, Jan. 9, 1890, to examine into the process in use by the Thomson Electric Welding Co., for welding metals, and to report as to its desirability and adaptability for naval purposes, and particularly for use on vessels of the navy. The board reported as follows:

We find that at the present time this process renders it possible, practically, to weld wrought-iron, cast-iron, brass and copper rods, from the size of the smallest electrical conductors in use for distributing purposes, to rods of 2½ in. diameter, and to weld pipes of larger sizes; to weld dissimilar metals and pieces of different forms of cross-section; to join by welding the ends of wire cables, and to form welded rings of small or large diameter. The operations necessary to accomplish these results were performed upon several different welders, and while none of them represent a machine for general use, it would be possible to construct one having removable clamps to suit different classes of work. As regards the strength of articles subjected to this process, in a majority of samples tested (several in our presence) the rupture did not take place in the weld itself, but at a short distance from it, in that portion of the metal which had become more or less affected by the heat. This would occur in the same way in the ordinary process of welding.

The system of welding renders easy many operations in the working of metals which with the forge and smith have heretofore been considered impossible. It is the unanimous opinion of the board that in the present day of ships constructed almost entirely of metals, and in which every fitting possible is made of metal, such a system as that which has been investigated by us becomes not only desirable, but a means to economy of expense, time and labor, and would add to the efficiency of the vessel under any condition of service. This system of welding occupies a position of its own; it is able to do not only a large part of the work of the forge now in use, but is capable of doing much work that was hitherto considered imposible. By its use, the large accumulation of now almost worthless boiler tubes stored at the navy yards could be made fit for service; and the quantity of spare tubes and of many other stores now carried by ships could be reduced. We are convinced that the Thomson welding process can be found of great utility to the naval service, both on shore and afloat, for the following reasons: It can be used, (*a*) in welding breaks in rods without altering them either in length or shape. (*b*) For welding tubes. (*c*) For welding angles and shapes of intricate form. (*d*) For welding copper, brass, cast iron or other metals. (*e*) For heating metals for forging, tempering and upsetting. (*f*) For welding wire cables. . . . The board consisted of Commander George A. Converse, U. S. N.; A. S. Greene, U. S. N.; Asst. Naval Constructor S. W. Armistead, U. S. N., and Ensign Gilbert Wilks, U. S. N.

The Cyclone Snow Plow.

The Southern Pacific has bought the right to manufacture and use the cyclone snow plow. The only machine yet built on the cyclone patents has been in use on the lines of the Central Pacific for some time, but we have as yet had no complete and trustworthy account of its performance. The action of the Southern Pacific company is some evidence of its efficiency.

Test of the Martin Car Heater.

On Jan. 25 a test was made of the Martin heater, using water circulation heated by steam from the engine, on the Erie road at Jersey City, to determine the rapidity of the circulation after steam is turned on and the pressure and time required to heat a car in mild weather. The test was made with a coach without passengers, and with seven deck sash opened. The temperature of the outside atmosphere was 58 degrees F. Ten lbs. of steam was turned on at 9.42 a. m. In 20 minutes the temperature of the car had risen eight degrees, and the steam pressure had increased to 14 lbs. After this the steam was turned off, and in the next 40 minutes the temperature rose 10 degrees more. At this point the end doors were opened, allowing a strong wind to blow through the car. In 10 minutes the temperature had fallen six degrees. One end door was then closed, and at the end of 10 minutes the temperature remained the same as before. The other door being then closed, the temperature rose two degrees in the next 10 minutes. After a lapse of one hour and 30 minutes, the water was boiling in the heater, so as to be audible when the ear was applied to its outside casing. The total length of time for which steam was applied was 20 minutes. The tests were made by Mr. A. E. Mitchell, Engineer of Tests of the Erie Railroad.

The Merchants' Bridge.

The bridge proper was completed Feb. 28, and it is expected that the approaches will be done and trains running over by April 1. In the contract there is a bonus of $350 per day for each day elapsing from the date of finishing the bridge to June 1. The Union Bridge Co. will, therefore, receive a bonus of $32,200.

The Martin System of Car Heating on the Union Pacific.

In speaking last week of the arrangements for continuous heating on the new fast mail trains of the Union Pacific, we said that the apparatus of the Consolidated Car Heating Co. would be used. In fact, the contract was given to the Martin Anti-Fire Car Heating Co., and the appliances of that company will be used throughout. The order is for equipment for 30 cars and 45 locomotives. The erroneous statement came to us from those who had special means of knowing the facts, and we had very good reason to suppose that it was correct.

Ventilation or Refrigeration.

We have received from Mr. R. M. Pancoast, of Camden, N. J., a considerable mass of correspondence on the question of ventilation or refrigeration of freight cars. He addressed to the largest receivers of Southern fruits, berries, etc., in three or four cities a question asking whether or not the best results might be expected in the future from the use of refrigerator cars or ventilated cars in handling such perishable produce. The correspondence which we have received contains answers from nearly 30 houses, which are unanimous in the opinion that better results will be had by ventilation than by refrigeration. It is said that all fruits carry better and last longer in a properly ventilated car than in refrigerater cars, but for strawberries and other small fruits no suitable ventilated car is now built.

The Gould Coupler Co.

The Gould Coupler Co., of which Charles A. Gould, of Buffalo, is President and General Manager, is to establish a malleable iron and steel plant at Black Rock for the manufacture of the coupler. A tract of land, comprising about 10 acres, and contiguous to the tracks of the New York Central & Hudson River road has been bought. On this site four one-story brick shops, one 80 × 600 ft., one 80 × 350 ft. and two 80 × 300 ft., will be built. The Gould coupler has been applied to cars of the New York Central & Hudson River road, West Shore, Erie, Lehigh Valley, Central of New Jersey, New York, Ontario & Western, Northern Pacific, New York, Susquehanna & Western, Delaware & Hudson, the Fall Brook Coal Co. and the Western New York & Pennsylvania.

The North River Bridge.

Mr. Lindenthal appeared before the House Committee on Commerce, March 5, to explain his proposed bridge over the Hudson River. The Chief of Engineers recommends that the height at centre be 155 ft. above mean tide; that the plans be submitted to the Secretary of War within a year after the passage of the act; that construction be begun within a year and finished within 10 years after the approval of the plans. With these amendments he sees no objection to the bill. Mr. Lindenthal says that the company will be willing to have the bridge 145 ft. above mean tide, which is higher than the Brooklyn bridge, but that a height of 155 ft. would increase the cost greatly and make the grades of the approaches very difficult. He also argued that the time that Gen. Casey would allow for beginning the work is entirely insufficient.

The Thomson Joint.

Since we illustrated this rail joint, May 18, 1888, some changes have been made in it. The thickness of the base has been reduced from 1 1/16 in. to ¾ in., reducing the weight and bringing the cost down to about the same as the Pennsylvania six-hole splice. The flange is no longer slotted for spiking, but left intact throughout the length, and stop spikes are placed at the ends.

Electric Car Lighting.

An endurance test of a new storage battery system for lighting railroad trains was made a few days since on the lines of the Union Pacific and the Chicago & Northwestern, between Denver and Chicago. The battery was made at Denver and is known as the Carpenter. The car presented a fine appearance when fully lighted up with eight 16 candle-power lamps inside and one in each vestibule, making ten lights on the car. Three of these lights give as much light as the three chandeliers formerly used, and the battery has a capacity to run the lights from Denver to Chicago and return. The inventors claim for it a capacity of ten lamps for thirty consecutive hours. The weight is 1,100 lbs. per car.

Inclined Plane Railroad.

A company has been organized in Kansas City to build an inclined plane railroad. Messrs. J. A. L. Waddell and J. W. Nier are the engineers.

THE SCRAP HEAP.

Seal Press Suit Decided.

Over a year ago the Buffalo Seal & Press Co., through their counsel, Howson & Howson, brought suit in New York against the New York Railway Press & Seal Co. for infringement of the Abbe patent for a seal press for pressing the leaden seals on wires for sealing car doors. The characteristic feature of the Abbe patented press is that it provides for the sidewise insertion of the seals and wires between a pair of rolling dies. The case came up for final hearing before Judge Wallace in the United States Circuit Court for the Southern District of New York, Feb. 24, and on the 26th the judge signed a decree in favor of the Buffalo company, sustaining the patent and granting an injunction restraining the infringement of complainant's rights under the Abbe patent.

A Cable Road for Mt. Pilatus.

According to the *Verkehrs Zeitung*, of Berlin, Germany a cable road has been designed for ascending Mt. Pilatus, and plans have been published.

Railroads in Japan.

Material progress in railroad building is reported from Japan. Two new construction companies have recently been formed with about $4,500,000 and $1,000,000 capital respectively. The work proposed by them of building two new lines has received government sanction and operations are shortly to be commenced. A third line of road is at present under consideration.

Mechanical Engineers' Library.

The Mechanical Engineers' Library Association has been incorporated, for the purpose of maintaining a free public library. The incorporators are: Stephen Wilcox, Charles H. Loring, Frederic R. Hutton, Horace See, F. Merian Wheeler, and Stephen W. Baldwin.

Strike of Brakemen.

About 60 yard brakemen, of the Pittsburgh & Lake Erie, at Pittsburgh, struck on Monday last for an advance in pay. The men are non-union and without a head. The Switchmen's Union, the Brakemen and Conductors' Brotherhood and the locomotive engineers have announced themselves as opposed to the strike. The strikers demand an increase from $1.90 to $2.10 for day and $2.20 for night work. No attempt was made to move freight trains on Monday.

Bridge Disasters.

A bridge of the American Midland Railway was carried away near Gilboa, Ohio, in the floods of last week. The road, being new and short of rolling stock and other appliances, suffers severely. The bridge of the Indiana Midland over White River, at Lebanon, Ind., was partly washed away. Other bridges had to be loaded with freight cars to hold them in place. The Little River bridge on the New River division of the Norfolk & Western, was carried away by a freshet last week, suspending travel for several days.

Losses from Snow and Washouts.

The figures on the loss of the Southern Pacific Company from snow and washouts are increasing day by day, and before the winter is over the loss will amount to nearly $2,000,000. General Manager A. N. Towne, upon his return from the East, estimated the loss at $1,000,000. Since that time the big washouts have occurred on the Oregon route. There will be $380,000 required to build a new roadbed in the Cow Creek Canon. The snow blockades have cost some $240,000 for extra labor, and this account is daily on the increase. The Oregon line is $100,000 behind in traffic, the Central Pacific the same amount, and the Los Angeles line about $50,000. The washouts in the Soledad Canon have cost $500,000, and there will be $75,000 more expended on the Oregon before that line is in running order, which makes the loss to date nearly $1,500,000.—*San Francisco paper*, Feb. 26.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Albany, 2 per cent., payable March 31.

Chicago & Alton, quarterly, $2 per share on the preferred and common stock, payable March 1.

Chicago & Northwestern, quarterly, 1¾ per cent. on the preferred stock, payable March 24.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Adirondack, special, 21 Cortlandt street, New York City, March 14, to act upon a proposed issue of bonds.

Atlanta & Charlotte Air Line, annual, 48 Wall street, New York City, March 12.

Central Union Depot & Railway Co., special, Central Union Station Building, Third street and Central avenue, Cincinnati, O., March 10.

Colorado Central, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

Denver, Marshall & Boulder, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

Danderberg Spiral, special, 831 Broadway, New York City, March 8 to act upon a proposed issue of bonds.

East Tennessee, Virginia & Georgia, special, Knoxville, Tenn., April 15.

Georgetown, Breckenridge & Leadville, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

Greeley, Salt Lake & Pacific, special, Union Depot, Denver, Colo., March 17, to act upon a proposed consolidation.

Illinois Central, annual, Chicago, Ill., March 12.

Kansas City, St. Louis & Chicago, annual, 511 Olive street, St. Louis, Mo., March 11.

Louisville, New Albany & Chicago, annual, 31 Nassau street, New York City, March 12.

Missouri Pacific, annual, St. Louis, Mo., March 11.

New York, Danbury & Boston, special, 96 Broadway, New York City, March 17.

St. Louis, Iron Mountain & Southern, annual, St. Louis, Mo., March 11.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Association of General Passenger and Ticket Agents* will hold its next annual convention in the City of Mexico, Mex., March 8.

The *Master Car Builders' Association* will hold its next annual convention at Old Point Comfort, Va., June 10. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The Master Mechanics' Association will hold its next annual convention at Chattanooga, Tenn., in June.

The *New England Roadmasters' Association* will hold its eighth annual meeting at Boston, Mass., Aug. 20 and 21.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *Northwest Railroad Club* meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Saturday following the second Wednesday of each month at 7:30 p. m. in the director's room of the St. Paul Union station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meet-

ings at the house of the Club, 1,122 Girard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Engineering Association of the Southwest* holds regular meetings on the second Thursday evening of each month at 8 o'clock, at the Association headquarters, Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

New England Railroad Club.

The annual meeting of the club will be held at the United States Hotel, Boston, Wednesday, March 12, at 7:30 p. m. The subject for discussion is freight car couplers.

Northwest Railroad Club.

The next meeting of the Northwest Railroad Club will be held at the Union Depot, St. Paul, at 7.30 p. m., on March 8. The subjects for discussion are: Axles for Heavy Tenders (continued); Brasses, the Best Form and Material, to be introduced by Mr. J. L. Greatsinger, of the Duluth & Iron Range.

PERSONAL.

—Mr. Jno. E. McClure, Western Passenger Agent of the Chicago, Milwaukee & St. Paul, died at Omaha, March 2.

—Col. James M. Donahue, President of the San Francisco & Northern Pacific, died in San Francisco March 3, of a complication of diseases, aged 30 years.

—Mr. Charles Blackwell has resigned the position of Assistant Superintendent of the Toledo, St. Louis & Kansas City, to enter the employ of Shoenberger & Co., of Pittsburgh.

—Mr. Jacob M. Schermerhorn, a former President of the Syracuse & Binghamton, and largely interested in other railroad companies, died in Syracuse, N. Y., March 2d. He was 86 years old.

—Mr. George Gage, for 25 years an engineer on the Eastern division of the New York, Lake Erie & Western, has been made Master Mechanic of the Pennsylvania, Poughkeepsie & Boston.

—Mr. John O'Day, who has been Vice-President and General Counsel of the St. Louis & San Francisco since May, 1889, has resigned on account of a difference with other officials concerning details in the operation of the road.

—Mr. C. T. Johns, Master Mechanic of the Valley Road of Ohio, has resigned that position. Mr. E. Kennerdell has been appointed General Foreman of the shops at Cleveland, and the office of Master Mechanic has been abolished.

—The employés of the Erie & Huron at Chatham presented Mr. G. R. Joughins, the Master Mechanic, with a watch and chain and an address on his departure for Norfolk, Va., to assume the duties of Master Mechanic of the Norfolk Southern.

—The New York, Cleveland and other daily papers have recently industriously circulated a report that Vice-President E. B. Thomas, of the New York, Lake Erie & Western, was to go to the New York, New Haven & Hartford. The report is, however, untrue.

—Mr. John Ewen, lately Superintendent of the Indiana division of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed Superintendent of Transportation of the Louisville, New Albany & Chicago, to succeed Mr. E. L. Ryder, resigned.

—Mr. Edwin Hawley, General Eastern Agent of the South Pacific, has been appointed Assistant General Traffic Manager, with headquarters in New York. Mr. Hawley was given a dinner last week by his railroad friends and merchants of New York.

—Mr. L. M. Berrien, engineer in charge of construction of the Buffalo reservoir for O'Brien & Clark, has accepted a position in the engineering department of the New York, New Haven & Hartford. Mr. Berrien was formerly Division Engineer of the Delaware, Lackawanna & Western.

—Mr. Frank S. Gannon, General Superintendent of the Staten Island Rapid Transit road, has been appointed to take charge of the Baltimore & Ohio interests east of Philadelphia, with the title of Eastern General Superintendent. This is in addition to his duties as General Superintendent of the Staten Island Rapid Transit.

—Mr. John Waterhouse, heretofore Principal Assistant Engineer of the Manhattan Elevated Railway, has been appointed Chief Engineer of that company in place of Mr. Robert I. Sloan. As we announced last week, Mr. Sloan has taken a position as Chief Engineer of the Southside Rapid Transit, one of the elevated railroads building in Chicago. The appointment of Mr. Waterhouse took effect March 1.

—Mr. M. F. Bonzano has been appointed Assistant General Superintendent of the Philadelphia & Reading. He has been in the employ of the company for the past ten years, beginning as a Supervisor, and being shortly afterwards made Division Engineer of the Philadelphia and New York division. In 1886 Mr. Bonanzo was appointed Superintendent of the Philadelphia and New York division and has since continued in that position.

—Mr. Benjamin F. Blue, General Freight and Passenger Agent of the St. Louis & Cairo Short Line, has resigned to accept a position with the Consolidated Coal Co., of St. Louis. Mr. Blue has been General Freight and Passenger Agent of the company since August, 1883, and was previously General Freight and Passenger Agent of the Chesapeake, Ohio & Southwestern. He has also held similar positions on the Paducah & Elizabethton and the St. Louis & Southeastern.

—Mr. Simon Borg, of the banking firm of Simon Borg & Co., 20 Nassau street, New York, has been elected President of the New York, Susquehanna & Western, and Mr. John P. Rafferty, who has been Treasurer of the company since Nov. 9, 1881, and Secretary and Treasurer since May 6, 1886, has been elected Second Vice-President. Mr. R. C. Shimeall, who has been the Cashier of the company for the last 15 years, has been elected Secretary and Treasurer.

—Mr. George W. Saul, General Manager of the Fort Wayne, Cincinnati & Louisville, has been appointed General Manager of the Chicago & Eastern Illinois, and the Chicago & Indiana Coal road, to succeed Mr. O. S. Lyford, resigned. Mr. Saul has also been appointed General Manager of the Evansville & Terre Haute, Peoria, Decatur & Evansville, and other lines in what is known as the Mackey system, excepting the Louisville, Evansville & St. Louis Consolidated, of which Col. George F. Evans still remains General Manager.

—Mr. Charles Watts, the new General Superintendent of the Pittsburgh, Fort Wayne & Chicago and allied lines, has been on the Pennsylvania system 23 years, having been conductor, station-master and train-master on the New York division before he went to the Chicago, St. Louis & Pittsburgh as Division Superintendent. He is about 45 years of age. The official notices of the various promotions on the Pennsylvania lines west of Pittsburgh which were noted in our last issue, indicate that the older officers (all of the officers named, except Mr. Watts) hold precisely the same position under each of the three roads, the Pennsylvania Co., the Pittsburg, Cincinnati & St. Louis and the Chicago, St. Louis & Pittsburgh. Their positions will therefore be the same under the proposed consolidation of Pennsylvania interests west of Pittsburgh.

ELECTIONS AND APPOINTMENTS.

Akron & Chicago Junction.—Thomas M. King, M. R. Dickey, E. J. Estep, William Thornburg, J. T. Johnson, J. B. Cavan and J. Bartol have been elected Directors of the company. W. Thornburg has been elected President and J. Bartol, Secretary.

Alabama Midland.—James T. Andrew has been made Cashier and Auditor of Disbursements of the road, with headquarters at Montgomery, Ala.

Atchison, Topeka & Santa Fe.—O. H. Brown has been appointed Assistant General Freight Agent, with headquarters in Topeka, a position which he held before being appointed Freight Claim Agent last December. On Feb. 3 the freight claim department was consolidated with the auditing department.

Baltimore & Ohio.—Frank S. Gannon, General Superintendent of the Staten Island Rapid Transit Co., has been appointed Eastern General Superintendent of the Philadelphia & New York division of the Baltimore & Ohio.

Bismarck, Kearney & Gulf.—The incorporators are Joel Hall, L. B. Cunningham, A. H. Bolton, Jr., L. Bennett and T. J. Parish.

Boston & Maine.—J. A. Farrington has been appointed Purchasing Agent, with office in Boston, to succeed G. F. Hurd, resigned.

Buffalo & Geneva.—The officers of this company are W. S. Bissell, President; Wm. Stevenson, Vice-President; Geo. M. Diven, Secretary; Howard Elmer, Treasurer, and Paul S. King, Chief Engineer. The office is at 284 Main street, Buffalo, N. Y.

Butler, Kendallville & Chicago.—The following officers have been elected: Samuel G. Stone, President; Capt. Hiram Iddings, Vice-President; W. P. Carpender, Secretary, and John Mitchell, Treasurer.

Charleston, Sumter & Northern.—I. W. Fowler has been appointed General Manager, in place of W. G. Brownson, resigned. C. L. Martin has been appointed Auditor, with office at Sumter, S. C.

Chesapeake & Ohio.—T. C. Eggleston, Engineer Maintenance of Way having resigned, F. I. Cabell has been appointed to the position, and the office of Assistant Engineer Maintenance of Way has been abolished.

W. J. McKee, who has been Assistant Superintendent of the Richmond, James River & Peninsular divisions, has been appointed Superintendent of the Huntington division, with office at Clifton Forge, Va., succeeding H. R. Dill, resigned

Chicago & Alton.—The jurisdiction of David Bowes, General Agent at Kansas City, has been extended, and his title has been changed to General Western Passenger Agent, with headquarters in St. Louis, Mo., and supervision of the passenger business west of the Missouri River, and west and south of St. Louis, to succeed the late S. H. Knight, whose title was General Agent of the passenger department. A. Hilton has been appointed General Agent. Passenger Department, with office at Kansas City, Mo., to succeed D. Bowes; J. M. Hunt has been appointed City Passenger and Ticket Agent, with office at St. Louis, Mo.

Chicago & Eastern Illinois.—O. S. Lyford having resigned as Vice-President and General Manager, and G. C. Kimball having resigned as Vice-President in charge of construction, George W. Saul has been appointed General Manager, and will assume the duties heretofore performed by these officers, with headquarters in Chicago, Ill. G. J. Grammar has been appointed Traffic Manager.

D. R. Patterson continues as General Superintendent. S. H. Spooner, General Attorney, has resigned, and W. H. Lyford has been appointed General Solicitor. S. H. Miller, Chief Engineer; E. F. Dawley, Assistant Engineer; and James Strong, Roadmaster, have resigned and the positions have been consolidated under H.F. Baldwin, with the title of Chief Engineer and Superintendent of Maintenance. W. G. Brimson, Trainmaster, has resigned, and the office has been abolished, the duties of W. S. Page, Superintendent of Transportation of the Chicago & Indiana Coal being extended. P. W. Drew, Superintendent of Telegraph, has resigned, and the position has been abolished. H. A. Rubidge, at present Secretary and Auditor, is made Special Auditor for the system. F. V. Davis, Freight Traffic Manager, has been appointed General Freight Agent.

Chicago, Harvey & State Line.—The first Board of Directors of this company and of the Chicago, Blue Island & State Line are William Shingleton, William Black, Walter I. Pratt, Charles H. Pringle and D. J. Evans.

Chicago & Ohio River.—At a recent meeting of the board of directors held in Chicago, A. N. Parlin was elected President and Austin Corbin Vice-President.

Chicago & Northwestern.—Henry A. Grass has been appointed General Eastern Passenger Agent, with headquarters at 409 Broadway, New York, to succeed E. D. Harrington. Mr. Grass was formerly General Freight and Passenger Agent of the Cornwall & Lebanon, and has been connected with the Chicago & Northwestern for about a year.

Judson La Barre, recently with the Western States Passenger Association, but who has been in the service of this company, has been appointed Chief Clerk of the General Ticket Department of that company.

H. R. Sanborn, Roadmaster of the Sioux Valley division, has been appointed Superintendent of Bridges and Buildings for the Dakota Central division, with headquarters at Huron, S. D., to succeed Earl F. Potter, appointed Engineer of the Wisconson division of the road.

Chicago, Rock Island & Pacific.—John Black, Jr., has been appointed General Foreman of the Chicago shops, vice W. W. Sprague resigned.

George L. Chatfield having resigned, the office of Assistant General Master Mechanic has been abolished.

Chicago, St. Louis & Pittsburgh.—In accordance with the organization for conducting the business of the company, as revised Feb. 24, James McCrea has been elected Second Vice-President, vice William Thaw, deceased, taking effect March 1. The following officers have been appointed by the Board of Directors: Joseph Wood, General Manager, to succeed James McCrea, elected Second Vice-President; E. B. Taylor, General Superintendent Transportation, to succeed Joseph Wood, appointed General Manager.

Chicago & West Michigan.—An official notice was issued Feb. 26, announcing the appointment of Charles M. Heald as general manager of the Chicago & West Michigan, Detroit, Lansing & Northern, and Saginaw Valley and St. Louis roads, to succeed J. B. Mulliken, resigned. The change went into effect March 1.

Cleveland, Cincinnati, Chicago & St. Louis.—The Ohio, Indiana & Western will be known hereafter as the Peoria & Eastern Railroad Co., and be operated as the Peoria division of the above road. J. A. Barnard, the President of the new company, will be General Manager of the Peoria division, which will extend from Peoria to Springfield, O.

Denver & Rio Grande.—Allen T. Wells has been appointed Assistant General Freight Agent, with office in Denver, Col., vice C. F. Zimmerman, resigned to accept a position with another company. The position of General Agent of the freight department, hitherto held by Mr. Welles, has been abolished. He has been in the employ of the company since 1881 commencing as a clerk.

Duluth Belt Line.—The incorporators are: John F. Moffett, Watertown, N. Y.; Charles T. Moffett, Syracuse, N. Y., and William Craig, Thomas C. Kennedy and James Sullivan, of Duluth.

Duluth & Iron Range.—J. L. Greatsinger has been appointed General Superintendent, with office at Two Harbors, Minn., in charge of all operating departments, vice S. T. Pope resigned.

Fordyce & Princeton.—Incorporated in Arkansas by E. E. Mason, Ward E. Farrow, Leroy Kirkland, W. J. Brown and W. N. Smith.

Fort Worth & Denver City.—H. M. Cushing has been appointed General Baggage Agent, with headquarters in Fort Worth, Tex.

Grand Trunk.—The appointment of John Burton, recently General Manager of the New York, Ontario & Western, as General Freight Agent of this line, to fill the vacancy caused by the death of Thomas Tandy some months ago, has been officially announced.

Haines' Brackett, Fort Clark & Rio Grande.—The directors of this Texas road for the first year are: Charles D. Haines, Kinderhook, N. Y.; Elmer T. Haines, Schenevus, N. Y.; Judson Kingsly, Troy, N. Y., and F. Mahon, I. L. Martin, C. C. Clamp and E. P. Lord, of Brackett, Tex.

Hannibal & St. Joseph.—Elliott Marshall has been appointed General Agent of the Hannibal & St. Joseph and Kansas City, St. Joseph & Council Bluffs, with office at Leavenworth, Kan., vice G. W. Nelles, resigned.

Hudson Suspension Bridge & New England.—Edward W. Serrell is Chief Engineer and President of this company, George O. Beach is Secretary and William Ladd is Treasurer. The principal office is at 38 Wall street, New York City.

Kanawha & Western.—The following officers have been elected: President, H. B. Cramer, New York; Vice-President, George R. Carr, Columbus; Treasurer, John A. Bagley, New York; Secretary, O. D. Knabenshue, Columbus; Chief Engineer, W. H. Jennings, Columbus; Directors, P. B. Cramer, C. V. Culver, Frank Johnson, W. H. Jennings and G. R. Carr.

Kearney, Denver & Northeastern.—The following directors have incorporated this company in Nebraska: Sylvester S. St. John, Byron H Bicknell, Willis L. Hard. N. H. Barker, H. G. Wiley, J. E. Miller, O. S. Marden, William J. Scott and E. M. Judd.

Louisville, New Albany & Chicago.—John Ewan has been appointed Superintendent of Transportion of the road, with headquarters at Lafayette, Ind., to succeed E. L. Ryder.

Mexican Central.—The third and fourth divisions of the road have been consolidated and the jurisdiction of R. E. Comfort, Superintendent of the fourth division, has been extended to Calera, a distance of 770 miles.

Middle Georgia & Atlantic.—The following are the officers of this road: President, E. C. Machen; Chief Engineer, L. W. Robert; Superintendent, A. J. McEvoy. The principal office is at Machen, Ga.

Minneapolis, St. Paul & Sault Ste. Marie.—The following appointments have been announced by the company: E. V. Skinner, General Eastern Agent; Walter Miller, Contracting Agent, with headquarters at 336 Broadway, New York; H. McMurtie, Freight and Passenger Agent; S. A. Monteith, Contracting Agent, with headquarters corner Third and Chestnut streets, Philadelphia.

Mobile & Ohio.—At the annual meeting of the stockholders in Mobile, Ala., Feb. 19, the following board of directors were elected: Adrian Iselen, Jr., H. B. Plant, A. H. Stevens, Sidney Shepard, R. K. Dow, J. H. Fay, James C. Clarke, F. D. Tappen, John Paton, T. G. Bush, E. L. Russell, W. J. Hearin, W. Butler Duncan.

Mt. Pleasant & Santee River.—J. C. McNaughton, of Philadelphia, has been elected President.

New York, Susquehanna & Western.—The annual meeting was held in Jersey City, N. J., Feb. 27, and these directors were elected: Simon Borg, Stephen V. White, Robert K. Dow, James M. Hartshorne, Henry Marks, Frank C. Lawrance, Jr., Alfred Sully, Charles Minzesheimer, Henry Sanford, John I. Blair, Garret A. Hobart Charles Siedler and George N. Farwell, the latter to succeed C. M. Heald. The following officers were elected: Simon Borg, President; S. V. White, Vice-President; J. P. Rafferty, Second Vice-President; R. C. Shimeall, Secretary and Treasurer.

Norfolk & Carolina.—The following officers were recently elected: George S. Scott, President, New York; Harry Walters, Vice-President; G. M. Serpell, General Manager; T. M. Emerson, General Freight and Passenger Agent; J. R. Kenly, Superintendent: B. R. Dunn, Chief Engineer; W. A. Reach, Auditor, and Charles G. Elliott, Treasurer. The offices are at Norfolk, Va.

Norfolk Southern.—G. R. Joughins has been appointed Master Mechanic in charge of rolling and floating equipment, taking effect March 1. His office is at Berkley, Va.

Northern Central.—These directors were elected at the annual meeting in Baltimore, Feb. 27: George B. Roberts, Wistar Morris, J. N. Hutchinson, John P. Green, J. N. DuBarry, E. B. Parsons and Senator J. Donald Cameron, of Philadelphia; Louis W. Hall, of Harrisburg, and George Small, B. F. Newcomer, Harry Walters and Henry James, of Baltimore. The directors organized by re-electing G. B. Roberts, President; Stephen W. White, Secretary; John S. Leib, Treasurer, and other officers.

Pennsylvania.—The New England territory has been detached from the jurisdiction of the Eastern Passenger Agent, and it will be known as the "New England District," comprising all of the New England states (except station on the New York, New Haven & Hartford south of and including New Haven, Conn.) and the Canadian provinces. George M. Roberts has been appointed Passenger Agent, New England District, with office at 205 Washington street, Boston, Mass.

Pennsylvania Co.—The following changes in officers have been officially announced in accordance with the organization for conducting the business of the company, as revised Feb. 24: James McCrea has been elected Second Vice-President, vice William Thaw, deceased, taking effect March 1. The following officers have been appointed by the Board of Directors: Joseph Wood, General Manager, to succeed James McCrea, elected Second Vice-President. E. B. Taylor, General Superintendent Transportation, to succeed Joseph Wood, appointed General Manager. Charles Watts, General Superintendent, to succeed E. B. Taylor, appointed General Superintendent Transportation.

Philadelphia & Reading.—The following changes took effect March 1: M. F. Bonzano, appointed Assistant General Superintendent, with office at 227 South Fourth street, Philadelphia. G. D. Whitcomb, appointed Superintendent of the Philadelphia & New York Division, with office in Philadelphia, to succeed M. F. Bonzano, promoted.

Philadelphia & Sea Shore.—Theodore F. Wurtz is Chief Engineer of this road with headquarters at Bridgeton, N. J.

Pittsburgh, Cincinnati & St. Louis.—In accordance with the organization for conducting the business of the company, as revised Feb. 24, James McCrea has been elected Second Vice-President, vice William Thaw, deceased, to take effect March 1, 1890. The following officers have been appointed by the board of directors: Joseph Wood, General Manager, to succeed James McCrea, elected Second Vice-President. E. B. Taylor, General Superintendent Transportation, to succeed Joseph Wood, appointed General Manager.

Portsmouth & South Mills.—Among the incorporators of this Virginia road are John T. West, F. M. Mullens, William A. West, of Norfolk County, and W. A. Lindsay, of Portsmouth, Va.

Potomac Western.—The incorporators are: R. T. Barton C. M. Gibbons, James B. Russell, E. Holmes Boyd and Charles F. Nelson.

Richmond & Danville.—E. T. Lamb has been appointed General Forwarding Agent of the Piedmont Air Line, vice P. H. Adams, taking effect March 1, 1890. His office is at West Point, Va. J. H. Drake has been appointed Acting General Claim Agent of the Piedmont Air Line, vice P. H. Adams. His office is at Richmond, Va.

In addition to his duties as General Superintendent, W. H. Green has been appointed Assistant General Manager of this company, and is authorized to act for the General Manager when necessary in all matters pertaining to the operation of the road.

St. Louis & Cairo Short Line.—George E. Larry has been appointed General Freight and Passenger Agent, to succeed B. F. Blue, resigned.

Savannah, Florida & Western.—The stockholders of the company have elected the following directors: H. B. Plant, H. S. Haines, M. K. Jesup, W. S. Chisholm, J. H. Estelle, Henry Sanford and M. J. O'Brien. H. B. Plant has been re-elected President; W. S. Chisholm, Vice-President; H. S. Haines, General Manager; R. B. Smith, Secretary, and J. M. Lee, Treasurer and Assistant Secretary.

Southern Pacific.—E. Hawley, General Eastern Agent of the road, has been appointed Assistant General Traffic Manager, with headquarters at 343 Broadway, New York.

Spokane Eastern.—Charles S. Dishman, William B. Dishman, John Johnston, Zelotes D. Brown, James D. McLean, Jesse N. Barker and James R. Dabney, of Spokane Falls, Wash., are the first board of trustees.

Syracuse & South Bay.—The officers of this company are: President, Hiram McGonegal; Vice-President, W. S. Wales; Secretary and Treasurer, A. E. Matthews, all of Syracuse, N. Y.

Union Pacific.—John Hewitt, Master Mechanic of the Detroit Division of the Wabash, has been appointed Master Mechanic of the Oregon Railway & Navigation Co.'s lines in place of J. Evans, resigned.

Valley (Ohio).—The office of Master Mechanic has been abolished, C. T. Johns having resigned. E. Kennerdell has been appointed General Foreman of the Cleveland shops, and will have charge of all duties performed heretofore by the Master Mechanic.

West Jersey.—At the annual meeting of the stock holders in Camden, N. J., March 4, these directors were elected: George B. Roberts, Coleman F. Leaming, John M. Moore, Thomas H. Dudley, George Wood, J. N. Du Barry, N. Parker Shortridge, Henry D. Welsh, William J. Sewell, Benjamin F. Lee, James H. Nixon, Josiah Wistar, David B. Gill, B. B. Comegys and William G. Nixon. George B. Roberts was re-elected President, William J. Sewell, Vice-President, and William Taylor, Treasurer.

West Virginia Central.—The following are named as incorporators in the charter filed at Charleston, W. Va., last week: Alexander Bondson, Franklin Noble, Frederick T. Clark, Silas A. Kroner and J. W. Ancott, of Philadelphia.

OLD AND NEW ROADS.

Alabama Midland.—Tracklaying on the road was completed Feb. 26. The connection was made at a point about 45 miles south of Montgomery, and 12 miles north of Troy. The surfacing has not yet been completed, and through trains between Bainbridge and Montgomery will probably not be put on for about three weeks.

Anniston & Atlantic.—About 200 men are working between Anniston and Coldwater, Ala., nine miles, making preparations for changing the track to standard gauge.

Astoria & South Coast.—Hoffman & Smith, of Portland, have entered into a contract with the Pacific Construction Co. to build this road from the south fork of the Lewis and Clarke river, to a point on the survey within ten miles of Hillsboro, Wash. The clearing, grubbing and grading is to be done for $1,000 a mile.

Atchison, Topeka & Santa Fe.—The purchase of $2,800,000 second mortgage six per cent. Atlantic & Pacific bonds by this company from Kidder, Peabody & Co., gave rise to considerable discussion in Boston this week. Regarding the transaction an officer of the company said: "In the plan of reorganization there were reserved $22,476,000 new general mortgage four per cent bonds, against an equal amount of old issues of seven different classes, which issues were to be made the subject of special treatment in the future, as stated in the circular of October 15. Among these seven issues were $2,800,000 of the Atlantic & Pacific, Western Division, second mortgage six per cent. bonds. The Atchison company has acquired these bonds on satisfactory terms. The total issue of Atlantic & Pacific second-mortgage bonds is $5,600,000. the principal and interest of which are guaranteed severally, but not jointly, each half by the Atchison and the St. Louis & San Francisco companies. There is no distinct separate guarantee of any number of bonds on the part of either company, but both guaranteed all bonds and coupons. The Atchison company in acquiring half of the total issue in effect acquires that for which it is responsible.

Atlantic & Danville.—A short branch from the main line near Clarksville, Va., north to the Buffalo Lithia Springs, is nearly completed.

Baltimore & Ohio.—The New York branch from the connection with the Central of New Jersey at Cranford, N. J., to St. George, Staten Island, was opened for freight traffic last week. The line will not be opened for passenger traffic until June. Extensive terminal grounds have been laid out at St. George, and a large pier and sheds have been erected at that point.

Bismarck, Kearney & Gulf.—Chartered in Nebraska, to build a road from a point on the south line of the State in Webster County to the north line of the State in Keyapaha County. The capital stock is $1,000,000.

Buffalo & Geneva.—The company has asked for proposals for the grading and masonry on the line from Grimesville, Erie County, N. Y., 10 miles east of Buffalo, to Geneva, a distance of 94 miles. Bids will be received until March 20. Specifications are at the office of the Chief Engineer, Paul S. King, 284 Main street, Buffalo.

Burlington & Missouri River.—A survey was commenced at Newcastle, Wyo., last week for an extension from that point north to Buffalo. A survey will also be made from New Castle to Sundrance.

Butler, Kendallville & Chicago.—A company of this name was organized at Butler, Ind., recently by citizens of Kendallville, Waterloo and Butler. The organizers announce that the road is to be an extension of the Wabash from Detroit to Chicago, extending from Butler west through Kendallville, Ligonier and Stillwell Junction to Chicago.

Canadian Pacific.—The Railway Committee of the Canadian Parliament have passed the bill giving this company power to issue bonds for the purchase of ocean steamships, not to exceed £1,200,000 sterling. The clause giving the company power to lease or to enter into traffic agreements with other companies was amended to include only such companies as had been authorized by Parliament to enter such arrangements with the Canadian Pacific.

The preliminary survey has been made for a proposed branch to the Atikokan Iron Range, Manitoba.

Cape Fear & Yadkin Valley.—The grading is about finished on the branch from Millboro to Ramseur, N. C. It is reported that a branch will be built from a point in Chatham County near Ore Hill, N. C., south through Saxapahaw, Graham and Big Falls.

Carolina Southern.—The company has been incorporated in South Carolina by W. G. Childs, James Woodwin and others. The survey will soon begin from Sumter, S. C., south.

Chagrin Falls & Southern.—An arrangement for a final transfer of this line to the Cleveland & Canton is about concluded. The road is narrow gauge and extends from Chagrin Falls to Solon, Ohio, on the New York, Pennsylvania & Ohio, a distance of five miles.

Chicago, Blue Island & State Line.—Articles of incorporation have been filed with the Secretary of State at Springfield, Ill., by this company, which proposes to construct a road from a point on the line dividing Illinois and Indiana, in Cook County, to Chicago. The principal business office is at Chicago and the capital stock is $5,000,000. The same board of directors has incorporated the Chicago, Harvey & State Line.

Chicago, Harvey & State Line.—The charter of this company has been filed in Illinois to build a road from a point on the line dividing the states of Indiana and Illinois to Chicago. The principal office will be at Chicago, and the capital stock is $3,000,000.

Chicago, Burlington & Quincy.—The earnings and expenses for January were as follows:

	1890.	1889.	In. or dec.
Passengers	$425,730	$410,679	D. $14,940
Freight	1,564,327	1,304,849	I. 259,478
Miscellaneous	191,340	170,676	I. 20,664
Gross earnings	$2,181,407	$1,916,204	I. $265,202
Oper. expen	1,368,285	1,462,326	D. 94,040
Net earnings	$813,122	$453,878	I. $359,243

The earnings of properties controlled by the company, but not included in the above, were as follows:

	1890.	1889.	
Gross earnings	$536,001	$548,420	D. $12,419
Oper. expen	393,355	392,349	I. 1,005
Net earnings	$142,645	$156,071	D. $13,425

Chicago & Northwestern.—The company is more or less steadily at work preparing to extend the amount of double track on its line between Chicago and Milwaukee. The total distance is 85 miles, of which about 30 miles is now double track, and cuts and embankments have been widened and preparations made to increase this amount. It is not contemplated, however, to push the work very rapidly.

Chicago, Rock Island & Pacific.—The right of way is being purchased for a line from Fairbury, Neb., in the southern part of the state, north to Lincoln and thence toward Omaha. A survey for the line was begun some time ago and is still in progress.

Cleveland, Cincinnati, Chicago & St. Louis.—The Whitewater road, extending from Harrison to Hagerstown, Ind., 65 miles, has, it is reported, passed under the control of this company, which connects with it by a branch at Harrison. The road has heretofore been operated in connection with the Fort Wayne, Cincinnati & Louisville.

Columbia & Carbonate.—This company has made application to the legislature of British Columbia for power to construct a line from a point on the Columbia River, about 17 miles up the said river and in an easterly direction from Golden, thence southwesterly to the head waters of the middle fork of the Spallemcheen River, and some point at the junction of Copper Creek thence to a point on the head waters of Copper Creek in the said province.

Columbia & Kootenay.—The British Columbia legislature has before it a bill to incorporate the company to construct a road from the outlet of Kootenay Lake, through the Selkirk range, to the junction of the Kootenay and Columbia rivers. A line of steamers is to be operated. Henry Abbott, John M. Browning and W. F. Salsbury, of Vancouver, B. C., are incorporators.

Columbia & Port Deposit.—The road was sold in Philadelphia, March 4, to the Pennsylvania for $1,890,000. The state of Maryland owns a large number of the shares of the capital stock, and all the remaining stock is held by the Pennsylvania. No interest or dividends have been paid for a number of years. The road extends from Columbia, Pa., to Port Deposit, Md., 40 miles, where it connects with the Philadelphia, Wilmington & Baltimore. The sale was made under two mortgages, dated Feb. 1, 1868, and March 25, 1875, held by the Pennsylvania.

Denver, Texas & Ft. Worth.—About five miles of grading has been completed on the Wichita Valley line which this company is building from Wichita Falls southwest to Seymour, Tex., about 30 miles.

Duluth Belt Line.—The company has filed a charter in Minnesota to build over practically the same route as that proposed by the Duluth & Superior Belt Line, which was incorporated a year ago. The road is to extend along the shores of Superior Bay and St. Louis Bay, and across Superior Bay from Rice's Point to Minnesota Point.

Eufaula Terminal.—About $130,000 has been subscribed to the capital stock of a construction company which has been organized to build this road from Eufaula, Ala., on the Central of Georgia, southwest about 65 miles through Lawrenceville and Abbeville to Dotham, on the Alabama Midland. The road will use the charter of the Eufaula & St. Andrews Bay road for part of the route. It is stated that grading will commence as soon as $200,000 has been subscribed to the stock of the construction company.

Farmville & Powhatan.—The road has been completed and opened for traffic the entire distance from Bermuda to Farmville, 90 miles. It has been in operation between Bermuda and Sunny Side, 65 miles, for some time, but the opening of the rest of the line has been postponed on account of the delay in erecting the bridges.

Florida Midland & Georgia.—The survey was commenced for this road at Valdosta, Ga., on the Georgia Southern & Florida last Monday. The survey will be continued south through Madison, Fla., to Deadman's Bay, a distance of about 90 miles. W. B. Thomas, of Tennille, Ga., has been appointed General Manager of the construction company building the road. Arthur Pou is Chief Engineer, with headquarters at Madison, Fla.

Fordyce & Princeton.—The company has filed articles of incorporation in Arkansas. The capital stock is placed at $140,000. The road will extend from Fordyce to Princeton, Dallas County, a distance of 22 miles.

French Broad Valley.—The company has given a mortgage deed to the Central Trust Co., of New York, to secure an issue of bonds amounting to $1,500,000, the proceeds of which are to be used in the construction and equipment of the road.

Georgia Pacific.—The survey for the extension to Helena, Ark., has been finished, and the estimates are now being made. The surveyors on the Yazoo City branch southward from Itta Bena, Miss., will reach Yazoo City, Miss., this week. On the Tallahatche branch from Itta Bena north to Cassidy Bayou, 35 miles, the track laying has been completed for 13 miles. The grades are light, and the curves are easy on the section now under construction, and there are no iron bridges or tunnels. Gibson & Corpening, of Birmingham, Ala., have the contract.

Gulf, Brazos Valley & Pacific.—The survey has been commenced between Millsap, on the Texas & Pacific, and Mineral Wells, Tex., about 19 miles. Grading will be commenced shortly.

Gulf & Chicago.—An advertisement has appeared in several daily newspapers, stating that bids for clearing, grading, bridging and furnishing cross-ties for a

distance of 365 miles, more or less, will be received at the office of the Secretary in Mobile, Ala., until April 8.

Henrietta, Jacksboro & Gulf.—This company has been organized at Henrietta, Tex., to build a road from that point south to Jacksboro, a distance of about 30 miles. Stock books have been opened at Henrietta and Jacksboro, and about $27,000 has been subscribed to the capital stock of the company. W. D. Stickney and J. B. Hopkins, of Henrietta, are interested in the project.

Hocking & Western.—The company was chartered in Ohio last week with a capital stock of $100,000, to build a road from a connection with the Kanawha & Ohio at Chauncey, in Athens County, northwest, a distance of 90 miles, to a connection with the Little Miami road at London, passing through the coalfields and opening up a more direct route to them from the northwest. The road is to be completed within 18 months. The capital stock will be increased to $500,000, and a mortgage for $200,000 will be issued.

Hudson Suspension Bridge & New England.—We have been given the following information for publication concerning this enterprise, which includes the erection of a bridge across the Hudson River and the construction of about 40 miles of connecting road. The bridge will be built across the Hudson River from Anthony's Nose (a promontory of the Highlands) near Peekskill, N. Y., on the east, to the site of old Fort Clinton on the west, and will be wide enough for a double track. The road will extend to the Connecticut State line on the east and to Turner's station on the New York, Lake Erie & Western on the west of the river, and southerly into New Jersey. Connections will be made with the New York & New England, the New York & Northern, and other eastern lines, while the western connections will include the New York, Ontario & Western, the New York, Susquehanna & Western, Lehigh & Hudson River, Lehigh Valley, Central of New Jersey, Philadelphia & Reading, Erie, and Pennsylvania. Fifty-year traffic contracts have already been made with six of the above roads, and others are pending. The bridge and road will be completed within two years. The work is generally moderately heavy, and some of it is quite heavy. Contracts have been made with Bullivant & Co., of England, for the wire strands for the cables, and with Talcott & Stanton for the construction of a tunnel through Bull Hill, a ridge intervening between the westernly end of the bridge and Turner's Station. A considerable amount of work has been done at Bull Hill Tunnel, and it is being pushed forward by as large a force of men as can be conveniently handled. On the east of the river the tower foundation is ready for the masonry; on the opposite side the West Shore has had a large force of men employed all winter in removing its tracks to permit the erection of the tower of the bridge at the water front; when this work is completed the tower foundation will be immediately commenced. The bridge will be a suspended girder, with a span of 1,620 ft. between the steel towers, 327 ft. high, standing upon the solid rock on each side of the river; this girder will continue through the towers to the land, a distance of 2,850 ft. in all. The Bull Hill tunnel will be 5,290 ft. in length, while the Shinn Viaduct over Peekskill Hollow will be about 1,000 ft. long. The company will own no rolling stock; its road on the bridge and east side of the river will be operated under contract by the New York & New England, while that on the west side will be operated by the connecting lines. Between $800,000 and $900,000 has been expended in prosecuting the preliminary work.

Edward W. Serrell is President and Chief Engineer and George O. Beach is Secretary. The office is at 38 William street, New York City.

Indiana, Illinois & Iowa.—The directors of the company have voted to refund the outstanding bonds into bonds of longer term and lower interest. It is rumored that this action is preliminary to the transfer of the road to a larger system.

International & Great Northern.—A block of the capital stock of the company, 97,284 shares out of the total of 97,550, and which was held by the Metropolitan Trust Co., of New York, in trust, was recently sold to Jay Gould for $822,378. The purchase was a formal one to protect the title of the Missouri Pacific. The International & Great Northern came into the possession of the Missouri, Kansas & Texas, May, 1881, by the exchange of two shares of stock of the latter for one share of stock of the former company. At the same time the Missouri Pacific leased the Missouri, Kansas & Texas, and under its operations up to the appointment of a receivership, in October, 1888, the lessor company, it is claimed, became largely indebted to the Missouri Pacific. To secure the advances made by the latter, the Missouri, Kansas & Texas placed the International & Great Northern stock in its treasury as collateral in trust with the Mercantile Trust Co. The claim of the Missouri Pacific has been in dispute, it being urged that offsets would largely reduce the debt of the Missouri, Kansas & Texas, which, with interest, equals the amount for which the stock was sold. The Olcott plan of purchase provides for the holding of the International & Great Northern stock jointly by the Missouri Pacific and the Missouri, Kansas & Texas. The United States Court at Topeka has confirmed the sale.

Jacksonville & Southeastern.—In the Circuit Court at Salem, Ill., a decree of foreclosure on the mortgages of the company to the amount of $1,100,000 has been granted. The court holds that the judgments obtained by certain Centralia property owners shall be prior liens to the extent of constitutional damages, and gives the bondholders the right to reopen the cases for the purpose of ascertaining what the amount of constitutional damages is. An appeal will be made by the bondholders to the higher courts.

Kanawha & Ohio.—The road was sold under foreclosure at Columbus, O., March 4, by order of the United States Court, in a suit brought by the Metropolitan Trust Co. for $505,000. It extends from Corning, O., to Charleston, W. Va., 129 miles. A receiver was appointed in February, 1889, and in December the decree of foreclosure was filed.

Kearney, Denver & Northeastern.—Incorporated in Nebraska, with a capital stock of $1,000,000, to build a road between Denver and Yankton.

Kentucky Union.—Work is being rapidly pushed on this line, and it will soon be opened between Lexington and Jackson, Breathitt County, Ky., 94 miles. Between Lexington and Winchester, 20 miles, the work is practically completed. A few heavy cuts have yet to be finished, but the tracklaying will not be retarded. From Winchester, southeast, the road is in operation for 38 miles, to a point beyond Slades. The grading is finished to the Kentucky River, about 50 miles from Winchester, and much of the tracklaying has been done. The bridge over the Kentucky River is being erected. It consists of two 105-ft. spans and one 300-ft. span, and is being erected by the New Jersey Steel & Iron Bridge Co. One shore span is already in place, and the river span, 300 ft. long, is now being erected.

Of the 11 miles between the Kentucky River and the Breathitt County line, 10 are graded with the exception of two short gaps, amounting in all to about 400 ft. of grading. The trestles are erected, and nothing will interfere with the tracklaying after the Kentucky River bridge is completed. The last mile will not be ready for the track until March 15. The delay has been occasioned by having to change from a cut to a tunnel on account of landslides. This tunnel is 920 ft. long, and there remains 600 ft. yet to take out. This work is progressing at the rate of 80 ft. per week. When this tunnel is finished there will be at least seven miles beyond it ready for the track. The cross-ties and rails are on hand and it is expected to lay the track from two points. Thirty-one miles remains to be laid. The road from Lexington to Jackson passes through Winchester, Dodge, Clay City and St. Helens. For the first 30 miles from Lexington the route is through a rolling country, but the rest of the line is through a hilly country. There are six tunnels between 300 and 1500 ft. long, and eight bridges.

La Crosse, Black River Falls & Eastern.—The name of the Black River Falls & Eastern has been changed to the above. The company has filed amendments to its charter for extensions from Black River Falls southwesterly through the counties of Jackson and La Crosse to La Crosse, and from Black River Falls northeasterly through the counties of Jackson, Clark, Wood and Marathon to Wausau, Wis.

Lafayette Union.—This company has been incorporated in Indiana to build a road around Lafayette, Ind., to connect all the lines now entering that city.

Los Angeles, Pasadena & Glendale.—Trains will be running in a short time on this line from Los Angeles to the Raymond Hotel, at South Pasadena, Cal., seven miles. The company leases the old Altadena road from Raymond, giving it an entrance to Pasadena one mile from Raymond. Excursion trains to the mountains back of Los Angeles will be run over the Altadena road. The former Los Angeles & Glendale is controlled by this company. It is eight miles long, of three feet gauge, and has a large suburban traffic. The gauge will probably be changed shortly. The new road between Los Angeles and South Pasadena has a good location. The difference in elevation is 700 ft., but the maximum grade is but 2½ per cent. The chief business of the line will be suburban traffic. The engines are Rhode Island Forneys, and the cars were built by Osgood Bradley & Sons, of Worcester, Mass. The road is owned by parties in St. Louis. George B. Leighton, 204 North Third street, St. Louis, is Vice-President.

Lynchburg & Durham.—Tracklaying has been begun south of Halifax, Va., and has been completed for some distance beyond the Dan River. It is expected to begin running trains from Lynchburg to that point before March 15.

Memphis & Atlantic.—The contract for grading the road from West Point to Abbott, Miss., has been let to J. E. Carothers. The work is proceeding rapidly, and it is expected will soon be in progress between Abbott and Houston.

Mexican Southern.—Read & Campbell, the contractors, are employing 1,200 men and are actively extending the line, which, when completed to Oaxaca, will open up a new mining district and give an outlet to an extensive agricultural region. Surveys have been completed from Puebla to Tecomavaca, and four parties of engineers are surveying beyond the latter point. The right of way has been secured for 125 miles, and the grading has been completed for 90 miles from Puebla. The masonry has been put in on 55 miles.

Midland (Indiana).—In the Federal Court at Indianapolis, Feb. 21, Judge Gresham sustained the demurrer of the Loan & Investment Co. to the cross-bill of the railroad and set aside so much of the previous order as required the plaintiff to deposit pledge bonds amounting to $1,000,000. He again refused to appoint a receiver, and continued the injunction against the company, restraining it from issuing any more bonds. The Loan & Investment Co. made advances to the company, and received as security a large amount of bonds. It was agreed that if the company issued any more bonds, it was to turn them over to the Investment Co. as additional security. The company claimed that additional bonds had been issued and not turned over to it.

Missouri, Kansas & Texas.—The United States Circuit Court at Topeka, Kan., has authorized the receivers to renew the lease of that part of the railroad from Holden, Mo., to Paola, Kan., 54 miles, to the Missouri Pacific for an annual rental of $27,500.

The survey for the branch from Henrietta southwest through Archer to Seymour, Tex., was commenced last week by B. F. Wathen.

Mobile, Jackson & Kansas City.—The company has let the contract to build and equip 183 miles of the line from Mobile, Ala., to Jackson, Miss., to the Anglo-Southern Construction Co. In two or three weeks that company will sublet the work and begin construction. The line will probably be finished to Jackson in 12 months. No construction work is going on now. The line is located, and the right of way secured. There are no tunnels or rock work on the line, it being nearly all light work, and through a fine tract of long-leaf yellow pine. It is a valley route, and will have a drawbridge at Pascagoula River, and three other 125-ft. wire or steel bridges at Dog Bowie and Stony rivers. One condition of the contract made with the Anglo-Southern Construction Co. was that Mobile should subscribe $250,000 of the preferred stock. This has been done, the city completing the subscription several weeks ago. The maximum grades are one per cent. and the maximum curves are four degrees. There are no cuts over 18 ft. deep. T. W. Nicol is Chief Engineer and M. B. Bond is Principal Assistant Engineer, with office in Mobile, Ala.

Monterey and Mexican Gulf.—Fully 4,000 men are at present engaged in construction work on this line in Mexico. McGavock, Price & Co. have the contract for grading. The company does the tracklaying with its own forces. The work is comparatively light; the maximum grade is 1½ per cent. and the curves are six degrees.

The road from Treviño, formerly Venadito, on the Mexican International through Monterey to Tampico, on the Gulf of Mexico, is about 450 miles long, and of this distance, 165 miles is finished from Treviño of Linares. Fifty miles has been graded south to Linares.

The road will be completed to Victoria, 200 miles, from Monterey by June, 1890, and to Tampico by March, 1891. The rolling stock at present delivered includes 7 engines, 23 passenger cars and 201 freight cars.

Nelson & Kootenay Lake.—This company is now seeking incorporation from the British Columbia legislature to operate a line from Nelson, on the west arm of Kootenay Lake, to the south end of Kootenay Lake.

Newfoundland.—The government discontinued work March 1. A contract will be entered into and advertisements inviting tenders will probably be issued shortly.

New Roads.—A company is asking a Dominion charter for a road from Orange Dale, on the Cape Breton line, to extensive coal lands in Broad Cove and Chéticamp, Inverness County. The line has been surveyed for about 30 miles.

A new road is projected between Liberty, Va., and Big Island, on the James River division of the Chesapeake & Ohio, a distance of about twenty miles.

A road is proposed from Greensboro, N. C., north to Milton, N. C., on the Atlantic & Danville.

The Southern Jellico Coal Co. will, it is stated, build a short road between Newcomb and Jellico, Tenn., on the Louisville & Nashville.

The House Committee on Indian Affairs has ordered favorable reports upon bills granting right of way to the following roads: Pittsburgh, Columbus & Fort Smith through the Indian Territory; to the Spokane Falls & Northern through the Colville Indian Reservation, Washington, and to the Pelouse & Spokane through the Nez Perce Reservation, Dakota.

Ex. Gov. Hindman, of Louisville, is interested in a project to build a road from Stanford, Lincoln county, Ky., southwest to a point in Cumberland county near the Tennessee State line.

The citizens of Fincastle, Va., propose to build a road from that place to Troutville, on the Shenandoah Valley road, a distance of about seven miles.

New York & New England.—The Supreme Court of Rhode Island has decided a case which involves about $1,000,000 worth of railroad real estate in the centre of Providence. The case has been under advisement over a year, and grew out of an attempt made by the road to fence in and use a tract of land above Weybossett Bridge. In 1852 the Hartford, Providence & Fishkill road obtained permission from the City Council to fill in this property, then under water, and use it for terminal facilities, provided it filled in all the land before Jan 1, 1857, and also built a retaining wall for the channel of the Womasquatucket River. The company did part of the work, but discontinued it, and the city finished it by authorization of the Legislature, the road promising to pay the expenses of the work later. Four years ago the New York & New England authorities, which succeeded the Hartford, Providence & Fishkill, built a fence, which the city promptly tore down. The matter was taken to the courts, and the final decision gives the city full title to the land.

New York, Susquehanna & Western.—The company is said to have agreed to operate, when built, a short road through the Saddle River Valley in Bergen County, N. J., from near Maywood on its line, to Monsey on the Pierpont branch of the New York, Lake Erie & Western. The distance is about 15 miles.

Norfolk Belt.—The survey was begun last week for this belt line at Norfolk, Va. The road will be built by the Norfolk & Western and the Norfolk & Carolina roads jointly.

Northwestern Coal & Navigation Co.—The bill before the Dominion Parliament, granting this company power to extend its road from Lethbridge, Man., through Fort McLeod to the summit of Crows' Nest Pass and thence to Hope Station on the Canadian Pacific, and from a point on the west side of the pass to the international boundary line, has been changed to read from Lethbridge to Fort McLeod, and thence towards Crows' Nest Pass to a point, to be hereafter determined by the government, but at least seven miles from the boundary of British Columbia.

Ohio, Indiana & Western.—The name of this road, which, as already noted, was sold at foreclosure at Indianapolis, Feb. 20, has been changed to the Peoria & Eastern. The line will hereafter be operated as the Peoria Division of the Cleveland, Cincinnati, Chicago & St. Louis.

Ohio & Northwestern.—The road is to be sold at foreclosure sale on March 13. The line extends from Cincinnati to Portsmouth, O., and was formerly known as the Cincinnati & Eastern.

Old Colony.—The General Assembly of Rhode Island has passed the bill authorizing the Providence, Warren & Bristol road to build an elevated extension from India street to connect with the proposed union station in Providence. The Old Colony is to give the New York, Providence & Boston the right to use the elevated tracks, upon the payment of a rental.

Omaha, Superior & Southwestern.—The company has been chartered in Kansas to build a road 200 miles long from a point on the State line between Kansas and Nebraska, in Jewell County, southwesterly, to connect with a road to be built through Ford County. The general offices will be at Cawker City.

Ontario, Carbondale & Scranton.—Tracklaying has been commenced at Hancock, N. Y., and has been finished to the Delaware River, a short distance from that point. The track is also being laid from Scranton, Carbondale and Stillwater. The road is being built from Hancock, on the New York, Ontario & Western, through Forest City, Carbondale and down the Lackawanna Valley to Scranton, the station and terminal grounds of the Central of New Jersey in Scranton being used. The grading and masonry is nearly completed, and all of the grading will be finished in about four weeks. There is considerable iron bridging, most of which is being done by Cofrode & Saylor, of Philadelphia. There are no very large or important bridges, except the iron bridge and viaduct crossing the Delaware River and the tracks of the New York, Lake Erie & Western at Hancock. The masonry for this bridge is now nearly completed, and Cofrode & Saylor have a large force erecting the iron work. The work is of the most substantial character, all the bridges and culverts being of iron and stone. The rails have been ordered and are nearly all on the ground. The rails used weigh 67 lbs. per yard, and are laid with long fish plates. There are no tunnels on the line. The rolling stock will be partly furnished by the New York, Ontario & Western, the lessee of the line. Five hundred coal cars have already been received, and 1,000 more are now being built under contract by the Lafayette Car Works, of Lafayette, Ind.; 25 locomotives are being built by the Dickson Manufacturing Co., of Scranton, and six have just been finished by the New York Locomotive Works, of Rome, N. Y. The road will be completed by the latter part of June.

Ontario Pacific.—The company has asked for power to issue $1,000,000 of five per cent. bonds to take up the present issue of six per cent. bonds.

Philadelphia & Reading.—The statement of the operation of the railroad for January, 1890, as compared with same month of 1889, is as below:

	1890.	1889.		Inc. or Dec.
Gross receipts	$1,566,730	$1,463 302	I.	$103,428
Oper. expen. excl. rent & int.	962,974	838,941	I.	124,033
Net profit in oper	603,756	624,361	D.	20,605
Profit from Dec. 1 to date	1,269,256	1,188,697	I.	80,559

Pittsburgh & Western.—The survey was begun this week for a six-mile branch from North Sewickley down the Conoquenessing River to the Beaver River, crossing the latter by a high bridge to Beaver, Pa., an important manufacturingtown.

Potomac Western.—The company has asked the Virginia Legislature for a charter to build a road from a point on the Potomac River opposite Washington to a point on the Shenandoah road, and thence to the West Virginia state line.

Rhode Island Western.—An effort is being made to revive interest in this project. It is proposed to build a road from Providence, R. I., to a point near Springfield, Mass., a distance of about 70 miles. The company has secured a charter in both Rhode Island and Connecticut.

Richmond & Danville.—The following is a comparison of the January earnings and expenses of this system, and including the Richmond & Danville, Virginia Midland, Charlotte, Columbus & Augusta, Columbia & Greenville, Western North Carolina, Georgia Pacific, Washington & Ohio, and the Ashville & Spartanburg roads, viz.:

	1890.	1889.	Inc.
Gross earnings	$1,107,883	$904,028	$203,804
Operating expenses	692,752	583,260	109,48.
Net earnings	$415,0·0	$320,755	$94,321

Rio Grande Southern.—It is announced that work on this road will probably be commenced this month. It is to be started at two points, from Dallas, Ouray County, Col., south, and from Durango, north. The distance is about 165 miles.

Roanoke & Southern.—Breen & Frelly, who had the contract for grading the road between Walnut Cove, N. C., and Martinsville, Va., have been awarded the contract for grading the section from Martinsville, north to Roanoke, Va.

Seattle & Northern.—Contracts for tracklaying on this road and for extending it east from its present terminus on the Skagit River will be let after March 15. The road is now graded from Anacortes, Wash., on Fidalgo Island, easterly up the Skagit River for a distance of 23 miles. It is expected to complete 60 miles of the road this season. The clearing is heavy but the grading is light, the maximum grade being 30 ft. to the mile and maximum curvature five degrees. The Oregon Improvement Co. is building the road.

Shreveport & Houston.—The United States Circuit Judge at Shreveport, La., on Feb. 22, issued a decree ordering the sale of the road. The sale was ordered under foreclosure proceedings instituted by the Union Trust Co., of New York, which holds $400,000 of first mortage bonds. The sale will be subject to the claim of $80,000 of Neil McDonald, of New York, represented by receiver's certificates with five years' interest at six per cent. The validity of the certificates is denied by the Union Trust Co. The Shreveport & Houston is a narrow gauge road, 40 miles long, from Shreveport and connecting at Logansport with the Houston East & West Texas, running to Houston, Tex.

Sioux City & Northern.—The company has given a mortgage on its line to the Manhattan Trust Company, of New York, to secure an issue of bonds to the amount of $20,000 per mile on the main line between Sioux City and Garretson, S. D., 96 miles, and for $16,000 per mile on the branches and extensions to be built by the company.

Passenger trains will begin running on regular schedules between Sioux City and Garretson, S. D., 96 miles, on March 17.

Sturges, Goshen & St. Louis.—The Metropolitan Trust Co. of New York has filed a mortgage for $400,000 in Indiana to secure three per cent. bonds.

Texas & Pacific.—The annual report for the year to Dec. 31, 1889, shows gross earnings of $6,917,802, an increase of over $543,000 over the preceding year, and a surplus, after working expenses and fixed charges, of $461,499, an increase of $278,772. Of this sum, $174,164 has been spent for betterments and new equipment, and the balance reserved for the same purpose.

Union Pacific.—The extension of the Omaha & Republican Valley Division of the Union Pacific system from Nontasket to Pleasonton, Neb., a distance of 12 miles, has been opened for busines.

Virginia, Missouri & Western.—The two houses of the Virginia Assembly have passed the bill allowing this road and a corporation chartered in Tennessee to build through Virginia. The charter states that it is proposed to build a road from Portsmouth, Va., to New Mexico. The bill was amended to prohibit the company from building any lateral branches or connecting lines in the State not allowed under the general law. Thomas Breen, of Philadelphia, is President.

Virginia Roads.—Bills have been introduced in the State Legislature to incorporate the following companies: Virginia, Missouri & Western to build a road from Norfolk, Va., to the junction of the Atlantic & Pacific and the Atchison, Topeka & Santa Fe in New Mexico, a distance of 1,640 miles. Thomas Breen, of Philadelphia, is President. Basic City, West Virginia & Pittsburgh to construct a road from Basic City, Va., to the West Virginia state line. C. E. Hoge, C. E. Holt, Edward Echols and others are incorporators. Augusta & Rockbridge; Potomac & Ohio; James River & Rockfish Gap Valley; Speedwell; Richmond, Manchester & Petersburg.

West Virginia Central.—A company of this name received a charter in West Virginia last week for a road from the Ohio River, at the town of Ceredo, W. Va., through the counties of Cabell and Putnam to Charleston, on the Chesapeake & Ohio, crossing the Kanawha near Charleston, and thence following the Kanawha River to Gauley River, up Gauley nearly to its source, through the counties of Kanawha, Fayette, Nicholas, Webster and Pocahontas to a point at or near Harronsburg, Rockingham County, Va., thence through the counties of Madison, Culpepper, Fauquier and Stafford, to Aquia Creek or Belleplain, on the Potomac River. The principal office is to be at Philadelphia, with an office at Charleston, W. Va. The capital stock is $5,000,000.

Wilmington, Onslow & East Carolina.—Tracklaying is to commence on this road very soon. The grading has been completed for nearly all the distance between Wilmington and Jacksonville, N. C., about 50 miles. T. A. McIntire, No. 212 Produce Exchange, New York City, has the contract for the grading and tracklaying. The maximum grade of the road is one per cent. and the maximum curve is two degrees. Most of the curves are not greater than one degree. Part of the rolling stock has already been purchased. Ewen McIntire, 212 Produce Exchange, New York, is President, and H. A. Whiting, Wilmington, N. C., is General Manager.

Yemassee & Walterboro.—It is stated that the company will soon let the contract to construct the road from Yemassee northeast to Walterboro and Pregnalls, S. C. A construction company will be formed. Gordon Gairdner, of Pregnalls, is Chief Engineer.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, March 5, 1890.

The most important change in the traffic situation has been the cut in the Missouri River passenger rates, as intimated in my letter of last week. On March 3 the Chicago, Milwaukee & St. Paul put in effect the following rates from Chicago:

	First class.	Second class.
Council Bluffs and Kansas City	$10.00	$8.00
Omaha	10.25	8.25
Sioux City	12.20	10.20

Eastbound the rates are $2 less on first and about $3 less on second class. This is a reduction westbound of $2.50 on first class and $4.50 eastbound. The second class rates are new, none having been quoted heretofore between these points. Corresponding reductions are made in intermediate rates. The St. Paul justifies its action on the ground that the current St. Paul rate, as made by the Burlington & Northern, constitutes an unjust discrimination, under the law, against the Missouri River gateways, which is not justified by outside competition. The Chicago, Burlington & Quincy will be the competitor most affected by the reduced rates.

Representatives of several of the Chicago roads, together with Chairman J. N. Faithorn of the Western Freight Association, attended the conference at Des Moines, Feb. 26, between the roads and the Iowa Manufacturers and Jobbers Association, before the State Board of Railroad Commissioners. The Mississippi River jobbers claimed that the roads were discriminating against them in issuing the new rates, in favor of Chicago, St. Louis and other eastern gateways, and demanded lower local rates. General Manager Ripley of the Burlington presented the case for the roads, arguing against any change in the rates. The jobbers were not unanimous in their request, and no conclusion was arrived at.

The Central Traffic Association roads have agreed that rates on all classes from river points, above Cincinnati, to western points, via river and rail shall be two cents per 100 lbs. less than the all-rail rates on first, second and third classes, and one cent on fourth, fifth and sixth classes.

The report published last week that the committee on reorganization of the different Associations had completed its report embodying a form of agreement, and that it had been accepted by nearly all the lines, was premature. The committee has been at work on the proposed agreement, but the frequent necessary absence of one or more of the members has rendered their progress slow.

The Fremont, Elkhorn & Missouri Valley have announced new rates on eastbound grain, extending the Mississippi River and Chicago basis over its line, notwithstanding the adverse decision by Chairman Walker.

The twelfth regular meeting of the Board of Managers of the Interstate Commerce Railway Association will be held at Chicago, March 12.

The lines interested have agreed to advance rates on grain and products, except corn, from East St. Louis to Toledo and Detroit to 12 cents per 100 lbs., March 15.

Traffic Notes.

The St. Louis Car Service Association handled during the three months ending Jan. 31, over 60,000 cars. The average detention was 2.23 days per car.

The Lake rates on grain from Chicago to Buffalo, including storage to the opening of navigation, are 2¾ cents per bushel on corn and 3 cents on wheat.

The steamer City of Cleveland, of the Detroit & Cleveland Steam Navigation Company, left Detroit March 1, for Cleveland. This is the earliest opening of navigation between these points in years.

One hundred thoroughbred trotting horses were recently sent in a single shipment from Los Angeles, Cal., to New York City. Seven cars were occupied and the value of the lot was estimated at $200,000. The freight was $880 per car.

The Secretary of Agriculture has issued the usual order respecting the transportation of cattle from Texas and the region from which cattle infected with splenetic fever are likely to come. The regulations are to remain in force from March 15 to Dec. 1.

The corn movement from Kansas farms is now heavier than it has been for six months, the increase being attributed to the recent reduction in the rate. Cars have again become scarce, and the notice to stop receiving corn for Baltimore on account of the blockade on the roads leading to that port, has been reissued.

It appears that the shortening of the time of the trains between Chicago and Council Bluffs, which connect with the Union Pacific fast mail, is to admit of a lengthening of the schedule west of the Missouri River, the time through to San Francisco being about the same as before. The limited passenger train and the fast mail, which have heretofore constituted one train from Omaha westward, will now be run separately from that city to Green River, Wyo. At that point the Oregon Short line takes off a portion of the cars and thence westward a single train will do the business the same as before.

Western Passenger Rates.

The Missouri Pacific has announced a passenger rate of $10 between Kansas City and Pueblo, and a rate of $5 between St. Louis and Kansas City. This is a reduction of the regular rate of $4 in the former instance and $2.50 in the latter. The rates from St. Louis to Leavenworth, Atchison, St. Joseph, Omaha and Pueblo are reduced proportionately. The Burlington and other roads have also announced reductions, and low rates will doubtless become general in all the territory between Chicago and Colorado.

The Chicago, Rock Island & Pacific announces at Denver a passenger rate from Denver to Chicago of $26.15. This is a reduction of $4.50, and went into effect March 4.

The San Francisco agency of the Chicago, Milwaukee & St. Paul announced on Monday last a reduction from $72.50 to $68 on first class tickets to Chicago, and from $47.50 to $40 on second-class tickets. Other lines made similar reductions.

Coal Traffic of London.

The amount of coal carried to London by rail during the month of January was 799,884 tons, being 70,814 tons more than in the corresponding month of 1889. The quantities carried by the various roads were as follows:

	Tons
Midland	252,393
London & Northwestern	175,307
Great Northern	123,979
Great Western	105,553
Great Eastern	134,906
London & Southwestern	5,542
Other lines	2,204
Total	799,884

Railroads receive on this freight about 1 cent per ton per mile. Consignees are complaining that this rate is too high; that the cost of transportation is only one-half cent per ton per mile, on trips of 150 miles and upward. The *Colliery Guardian*, which has collected these figures, states that railroads earn £2,570,000 annually from the London coal traffic.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, March 1, amounted to 106,282 tons, against 72,933 tons during the preceding week, an increase of 33,449 tons, and against 65,345 tons during the corresponding week of 1889, an increase of 40,937 tons. The proportions carried by each road were:

	W'k to Mch. 1.		W'k to Feb. 22.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	12,226	11.4	7,614	10.4
Wabash	8,081	7.5	5,630	7.7
Lake Shore & Michigan South.	27,228	25.5	16,264	22.3
Pitts., Ft. Wayne & Chicago	12 5)6	11.8	10,042	13.8
Chicago, St. Louis & Pitts.	7,999	7.4	8,150	11 2
Baltimore & Ohio	7 636	7.1	4,790	6.5
Chicago & Grand Trunk	12 807	12.0	8,055	11.0
New York, Chic. & St. Louis	7,009	6 4	4 751	6.6
Chicago & Atlantic	10 656	9.9	7,057	9.5
Total	106.232	100.0	72,933	100.0

Of the above shipments 3,992 tons were flour, 66,418 tons grain, 2,317 tons millstuffs, 5,504 tons cured meats, 4,078 tons lard, 9,526 tons dressed beef, 1,401 tons butter, 1,471 tons hides, 171 tons wool and 6,674 tons lumber. The three Vanderbilt lines carried 44.3 per cent. of all the business, while the two Pennsylvania lines carried but 19.2 per cent.

Boston Passenger Traffic.

The Boston *Herald* has compiled some statistics of the passenger travel on the steam railroads of that city, the principal parts of which are copied below:

PASSENGER TRAFFIC OF BOSTON RAILROADS.

	Boston & Albany.	Boston & Maine.	Fitchburg.	New York & New England.	Old Colony.	Boston, Revere Beach & Lynn.	Totals.
Passengers carried	10,847,635	28,103,936	5,755,475	7,381,179	19,800,229	2,372,492	74,260,946
Passenger mileage	194,676,589	364,235,763	87,501,32›	95,746,000	236,386,857	12,427,459	990,973,994
Average miles each passenger traveled	17.95	12.96	15.20	12 95	11.97	5.23	12.72
Passengers to and from Boston	6,542,543	18,309,256	3,480,675	2,980,111	11,492,030	2,372,492	45,177,107
*Number of trains each week day—summer, three months	150	414	102	88	286	128	1,168
*Number of trains each week day—nine months	154	382	101	76	279	48	1,040
†Number of trains each Sunday—summer, three months	34	143	32	14	63	88	374
†Number of trains each Sunday—nine months	35	109	26	14	57	26	267
Total number of trains during the year	49,697	127,172	33,121	25,376	90,915	23,422	349,703
Average number of passengers per train	132	144	105	118	125	101	129
Average number of passengers each week day	20,196	56,160	10,605	9,322	34,750	6,767	137,800
Average number of passengers each Sunday	4,610	14,400	2,910	1,652	7,500	4,242	35,344

*The average number of trains each week day through the year was 1,072.
†The average number of trains each Sunday through the year was 292.

The trains of the Fitchburg and of the three divisions of the Boston & Maine have to cross the Charles River by drawbridges to enter the city, and it is figured out that the regular passenger trains of the four lines cross the river about 500 times in the 18 hours from 6 a. m. to midnight, equal to one train every two minutes. Besides this, innumerable freight, switching and empty passenger trains are crossing the bridges at all hours.